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CANADA

OPERATION INSTRUCTIONS

AND USERS MANUAL

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OPTIMUS360 BY SeaStar

Joystick Control System

To the End User (Owner)

Thank you for choosing an Optimus™ 360 Joystick Control System by Teleflex Marine. This User's manual contains all of the information that you will require for safe use of your vessel control system and must remain on the boat.

NOTICE

All information, illustrations and specifications in this manual are based on the latest information available at the time of publishing. The illustrations used in this manual are intended as representative reference views only. Moreover, because of our continuous product improvement policy, we may modify information, illustrations and/or specifications to explain and/or exemplify a product, service or maintenance improvement. We reserve the right to make any change at any time without notice.

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California
Proposition 65 Warning

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and reproductive harm.
Wash hands after handling.

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NMEA 2000® is a registered trademark of the National Marine Electronics Association.

Optimus 360™ is a trademark of Teleflex Marine.

Notice to the Operator

Throughout this publication, Dangers, Warnings and Cautions (accompanied by the International Hazard Symbol ⚠) are used to alert the user to special instructions concerning a particular service or operation that may be hazardous if ignored, performed incorrectly, or carelessly.

Observe Them Carefully!

These “safety alerts” alone, cannot eliminate the hazards that they signal. Strict compliance to these special instructions when operating and maintaining, plus “common sense” operation, are major accident prevention measures.

Failure to adhere to these notices may result in the loss of steering and shift/throttle control, leading to possible ejection from the vessel, causing property damage, personal injury and/or death.

⚠ DANGER

Immediate hazards which, if not acted upon, WILL result in severe personal injury or death.

⚠ WARNING

Hazards or unsafe practices which, if not acted upon, COULD result in severe personal injury or death.

⚠ CAUTION

Hazards or unsafe practices which COULD result in minor injury or product or property damage.

NOTICE

Information which is important to proper use or maintenance, but is not hazard-related.

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1.0 SAFETY INFORMATION

⚠ WARNING

The safety information provided below is intended to inform you of the dangers that may be present before, during and after use. It is critical that you read and understand ALL the points noted.

The safe operation of the vessel control system is dependant upon proper installation and maintenance, common sense, safe judgement and the knowledge/expertise of the operator. Every installer/user of the vessel control system should know the following requirements before installing/using the vessel control system. If you have any questions regarding any of these warnings, contact Teleflex Marine.

To reduce risk of severe injury or death:

⚠ WARNING

The Optimus 360 System MUST ONLY be installed by an authorized Teleflex Marine dealer.

1. Always wear a Coast Guard Approved personal flotation device (PFD) and use an engine shut-off cord (lanyard).
2. Read and understand this User's manuals and the Quick Reference Card provided with your vessel control components.
3. Optimus 360 components are highly engineered and safety tested to ensure system integrity. DO NOT substitute any component with non-Optimus 360 components, as this may compromise system performance/reliability.

Prior to every use

Perform a system inspection as outlined below. Refer to Section 7.3 for further details.

1. Check steering fluid level in all steering pumps.
2. Verify immediate steering response when turning steering wheel(s).
3. Inspect all steering hoses, fittings and mechanical and electrical cables for wear, kinks, or leaks.
4. Check for binding, loose, worn or leaking steering or shift/throttle control components.
5. Verify proper shift and throttle response for all control handles.
6. Verify that no alarms or warnings are shown on the CANtrak display.

Do not operate boat if any component is not in proper working condition.

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1.0 Safety information (continued)

During use

1. WEAR A COAST GUARD-APPROVED PERSONAL FLOTATION DEVICE (PFD).
2. Attach engine shut-off cord (lanyard) to your pfd.
3. Never allow anyone not familiar with the operation of the vessel control system to operate the boat at ANY time.
4. Know and adhere to the operator restrictions for you area including:
   - Federal Laws/Regulations,
   - State Laws/Regulations and
   - Municipal Laws/Regulations.

DO NOT OPERATE BOAT IF ANY COMPONENT IS NOT IN PROPER WORKING CONDITION.

After use

Rinse off SmartCylinders thoroughly using “fresh, clean water” only.

Do NOT rinse PCM, pumps, or actuators.

- Cleaning fluids containing ammonia, acids or any other corrosive ingredients **MUST NOT** be used for cleaning any part of the Optimus 360 System.

Maintenance

Maintain Optimus 360 System as directed in Section 11.0 of this Manual.

Keep our waters clean for all current and future users. Dispose of ALL fluids in accordance with your local regulations.

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Safety Labels

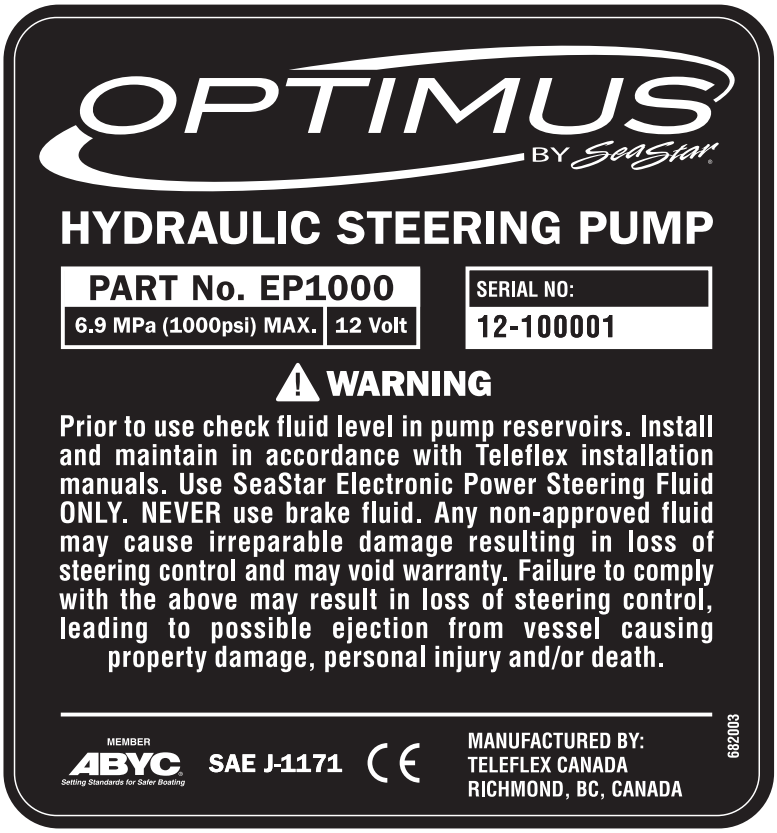
⚠ WARNING

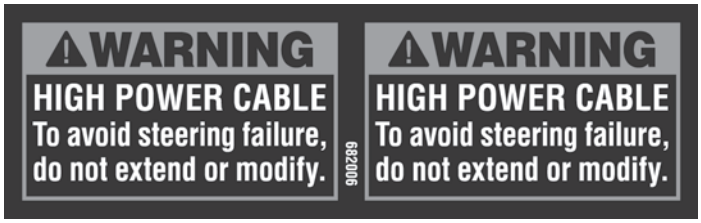
NOTE: The labels below should call attention to the possible hazards associated with the equipment shown later in this manual (see Section 3.1)

Control Head Label

⚠ WARNING
PID# 682050
U.S. COAST GUARD REQUIRES START-IN-GEAR PROTECTION. IF YOUR ENGINE DOES NOT HAVE THIS FEATURE, THIS CONTROL WILL PROVIDE START-IN-GEAR PROTECTION MEETING U.S.C.G. REQUIREMENTS OF 33 CFR PART 183, SUBPART L. CONSULT INSTALLATION MANUAL.

Hydraulic Pump Label


OPTIMUS
BY SeaStar
HYDRAULIC STEERING PUMP
PART No. EP1000
6.9 MPa (1000psi) MAX.
12 Volt
SERIAL NO:
12-100001
⚠ WARNING
Prior to use check fluid level in pump reservoirs. Install and maintain in accordance with Teleflex installation manuals. Use SeaStar Electronic Power Steering Fluid ONLY. NEVER use brake fluid. Any non-approved fluid may cause irreparable damage resulting in loss of steering control and may void warranty. Failure to comply with the above may result in loss of steering control, leading to possible ejection from vessel causing property damage, personal injury and/or death.
MEMBER
ABYC
Setting Standards for Safer Boating
SAE J-1171
MANUFACTURED BY:
TELEFLEX CANADA
RICHMOND, BC, CANADA
682003


⚠ WARNING
HIGH POWER CABLE
To avoid steering failure, do not extend or modify.
682006
⚠ WARNING
HIGH POWER CABLE
To avoid steering failure, do not extend or modify.

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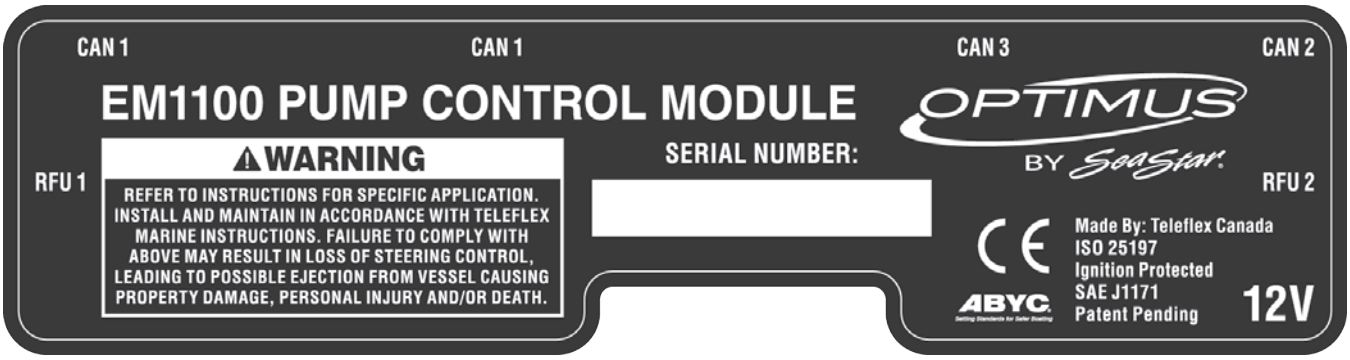
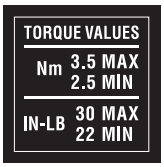
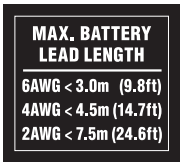
Safety Labels (continued)

Pump Control Module (PCM) Labels

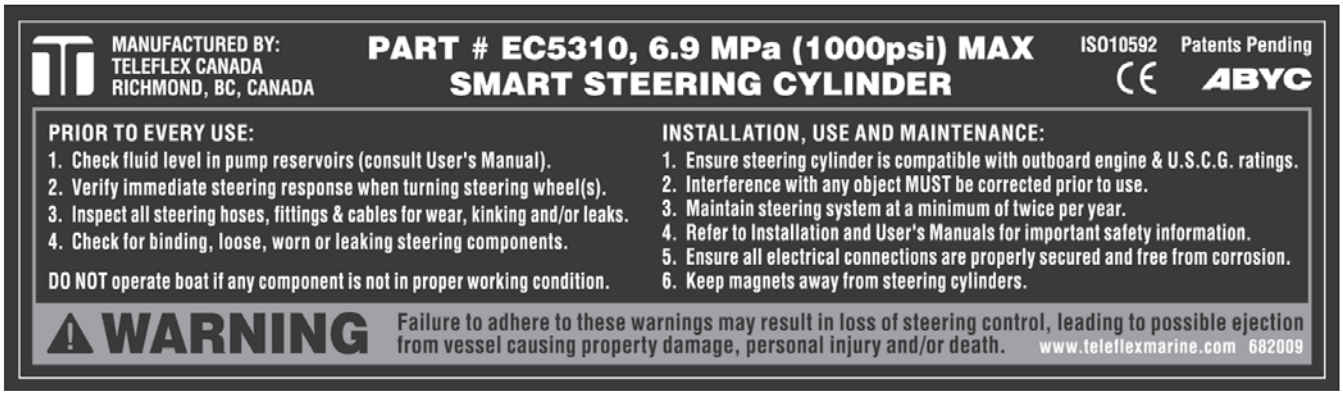

CAN 1
CAN 1
CAN 3
CAN 2
EM1100 PUMP CONTROL MODULE
OPTIMUS
BY SeaStar
WARNING
REFER TO INSTRUCTIONS FOR SPECIFIC APPLICATION. INSTALL AND MAINTAIN IN ACCORDANCE WITH TELEFLEX MARINE INSTRUCTIONS. FAILURE TO COMPLY WITH ABOVE MAY RESULT IN LOSS OF STEERING CONTROL, LEADING TO POSSIBLE EJECTION FROM VESSEL CAUSING PROPERTY DAMAGE, PERSONAL INJURY AND/OR DEATH.
SERIAL NUMBER:
RFU 1
RFU 2
Made By: Teleflex Canada
ISO 25197
Ignition Protected
SAE J1171
Patent Pending
12V
ABYC

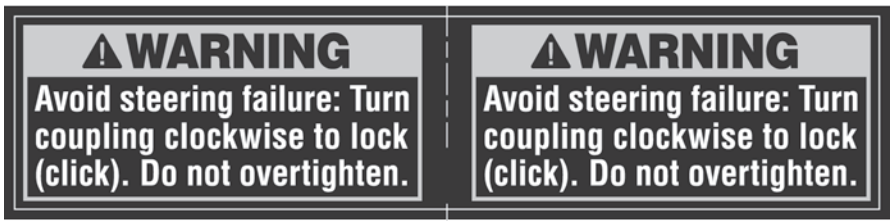




WARNING
Improper installation may cause loss of boat control.
Follow Rigging Manual carefully. • Secure all connections.
• Cap all unused connectors.
• Secure cables to tabs with cable ties.
682036

SmartCylinder Labels


MANUFACTURED BY:
TELEFLEX CANADA
RICHMOND, BC, CANADA
PART # EC5310, 6.9 MPa (1000psi) MAX
SMART STEERING CYLINDER
ISO10592
Patents Pending
ABYC
PRIOR TO EVERY USE:
1. Check fluid level in pump reservoirs (consult User's Manual).
2. Verify immediate steering response when turning steering wheel(s).
3. Inspect all steering hoses, fittings & cables for wear, kinking and/or leaks.
4. Check for binding, loose, worn or leaking steering components.
DO NOT operate boat if any component is not in proper working condition.
INSTALLATION, USE AND MAINTENANCE:
1. Ensure steering cylinder is compatible with outboard engine & U.S.C.G. ratings.
2. Interference with any object MUST be corrected prior to use.
3. Maintain steering system at a minimum of twice per year.
4. Refer to Installation and User's Manuals for important safety information.
5. Ensure all electrical connections are properly secured and free from corrosion.
6. Keep magnets away from steering cylinders.
WARNING
Failure to adhere to these warnings may result in loss of steering control, leading to possible ejection from vessel causing property damage, personal injury and/or death.
www.teleflexmarine.com 682009


WARNING
Avoid steering failure: Turn coupling clockwise to lock (click). Do not overtighten.
WARNING
Avoid steering failure: Turn coupling clockwise to lock (click). Do not overtighten.

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Safety Labels (continued)

Steering Service Valve Label

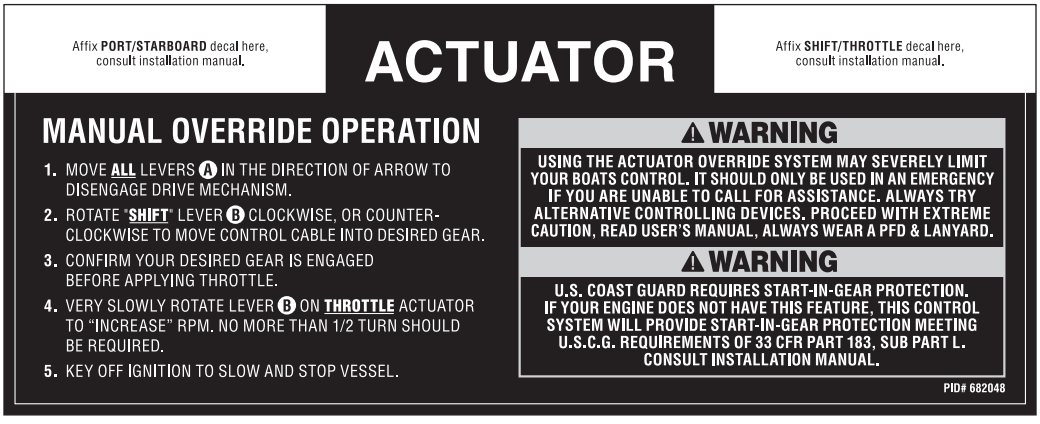
U
D
OPEN
CLOSED
STEERING SERVICE VALVE #HA5480
WARNING
DO NOT OPEN VALVE WITH ENGINES RUNNING. OPEN VALVE AND MANUALLY MOVE ENGINES TO REPOSTION, THEN CLOSE VALVE. INSTALL AND MAINTAIN IN ACCORDANCE WITH TELEFLEX INSTRUCTIONS. FAILURE TO COMPLY WITH THE ABOVE MAY RESULT IN LOSS OF STEERING CONTROL LEADING TO POSSIBLE EJECTION FROM VESSEL CAUSING PROPERTY DAMAGE, PERSONAL INJURY AND/OR DEATH.

STEERING SERVICE VALVE
OPERATION:
• TURN OFF ENGINES • OPEN VALVE
• MANUALLY MOVE ENGINE(S) TO REPOSITION • CLOSE VALVE
WARNING
DO NOT OPEN VALVE WITH ENGINE(S) RUNNING
FAILURE TO COMPLY WITH THE ABOVE MAY RESULT IN LOSS OF STEERING CONTROL LEADING TO POSSIBLE EJECTION FROM VESSEL CAUSING PROPERTY DAMAGE, PERSONAL INJURY AND/OR DEATH.
214461

TO BE INSTALLED CLOSE TO THE SERVICE VALVE

Actuators Note: Actuator labels not shown 100% of actual size.

A
Insert appropriate F, R, IDLE or INCREASE decal here. Consult installation manual.
B
Insert appropriate F, R, IDLE or INCREASE decal here. Consult installation manual.
PID# 682049


Affix PORT/STARBOARD decal here, consult installation manual.
ACTUATOR
Affix SHIFT/THROTTLE decal here, consult installation manual.
MANUAL OVERRIDE OPERATION
1. MOVE ALL LEVERS A IN THE DIRECTION OF ARROW TO DISENGAGE DRIVE MECHANISM.
2. ROTATE "SHIFT" LEVER B CLOCKWISE, OR COUNTER-CLOCKWISE TO MOVE CONTROL CABLE INTO DESIRED GEAR.
3. CONFIRM YOUR DESIRED GEAR IS ENGAGED BEFORE APPLYING THROTTLE.
4. VERY SLOWLY ROTATE LEVER B ON THROTTLE ACTUATOR TO "INCREASE" RPM. NO MORE THAN 1/2 TURN SHOULD BE REQUIRED.
5. KEY OFF IGNITION TO SLOW AND STOP VESSEL.
WARNING
USING THE ACTUATOR OVERRIDE SYSTEM MAY SEVERELY LIMIT YOUR BOATS CONTROL. IT SHOULD ONLY BE USED IN AN EMERGENCY IF YOU ARE UNABLE TO CALL FOR ASSISTANCE. ALWAYS TRY ALTERNATIVE CONTROLLING DEVICES. PROCEED WITH EXTREME CAUTION, READ USER'S MANUAL, ALWAYS WEAR A PFD & LANYARD.
WARNING
U.S. COAST GUARD REQUIRES START-IN-GEAR PROTECTION. IF YOUR ENGINE DOES NOT HAVE THIS FEATURE, THIS CONTROL SYSTEM WILL PROVIDE START-IN-GEAR PROTECTION MEETING U.S.C.G. REQUIREMENTS OF 33 CFR PART 183, SUB PART L. CONSULT INSTALLATION MANUAL.
PID# 682048

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ABBREVIATIONS

The following abbreviations are used in this manual:

ABYC	American Boat & Yacht Council
AP	Autopilot
AUX	Auxiliary
AWG	American Wire Gauge
BAT	Battery
CAN	Control Area Network
CAN Bus	Control Area Network (data) Bus. (A cable of wires that carry digital signals and power between electronic modules)
ECU	Electronic Control Unit
EIM	Engine Interface Module
ENG	Engine
EPS	Electronic Power Steering
EST	Electronic Shift and Throttle
F	Forward
GND	Ground
GPS	Global Positioning System
HI	High
INFO	Information
KHz	Kilohertz
Km/h	Kilometers Per Hour
LED	Light Emitting Diode
Lo	Low
mA or mAmp	Milliamp (1/1000 of an ampere)
MAG	Magnetic
MPH	Miles Per Hour
N	Neutral
NMEA	National Maritime Electronics Association
NMEA 2000®	The special protocol for digital communication on a CAN Bus
Nm	Nautical Miles
NSP	Neutral Start Protection
NTW	Neutral Throttle Warmup
N/C	No Connection
PCM	Pump Control Module
PGN	Parameter Group Number
PSI	Pounds Per Square Inch
PTS	Power Train Sync
R	Reverse
RPM	Revolutions Per Minute
SOG	Speed Over Ground
SOW	Speed Over Water
STBD	Starboard (right when facing the front of the boat)
SW	Switch
TM	Trolling Mode
WOT	Wide Open Throttle

Note: Some abbreviations not listed here may be found in their respective sections.

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DEFINITIONS

Conventional Steering Control	This is the standard type of steering that has been used on boats for many years. The steering wheel is the only means of control.
Conventional Shift & Throttle	The type of shift and throttle control where standard control head levers allows the engine gear selection and throttle control.
Neutral Throttle Warmup	This features allows the engine RPMs to be adjusted without the engine going into gear.
Power Train Sync	This feature automatically sets both engines to the same RPM level. When Power Train Sync is selected, the gears and the throttles are operated by one control lever.
Trolling Mode	A control feature which limits the full throttle lever position on the control to a percentage of the true engine maximum RPM's; it improves forward control of the boat at slow speeds. Default is 50% forward and may be set from 0% to 90%.
Joystick Control	A single handle joystick control device that integrates the steering, the gear shift, and the throttle control for multiple engines into one easy-to-use device to provide docking control of the vessel.

2.0 INTRODUCTION

2.1 Welcome

Welcome to the world of electronic joystick control. Please take a few minutes to go through the System Overview and the First Time Operation sections to assure your safety and to get the most enjoyment from the Optimus 360 joystick control system.

2.2 Optimus 360 System Overview

An Optimus 360 system consists of:

a) An Electronic Power Steering (EPS) system to provide effortless conventional steering.

b) An Electronic Shift and Throttle (EST) control system to provide ease of shift and throttle operation and various convenience features.

c) An Electronic Joystick control system that can combine the EPS and the EST systems to provide complete boat control using a single intuitive interface.

d) An electronic display to provide system status, faults, and instructions.

The EPS system consists of an electronic helm located behind the steering wheel that is electrically connected to a pump control module. This module converts the steering wheel action to electrical signals that operate hydraulic pumps. These pumps move the smart steering cylinders (SmartCylinders) at each engine.

A position sensor is part of the SmartCylinders and provides engine position information back to the pump control module. service valves are installed between the hydraulic pumps and the SmartCylinders to allow for manual positioning of the engines should a fault occur or during servicing.

The EST system has a control head at each helm station to control the gear selection and operate the throttle. The control head sends electronic signals to actuators that move the shift and throttle control cables connected to the engine's control levers.

The Joystick Control system consists of a Joystick which interfaces to the EPS and EST system and, when activated, controls the overall motion of the boat. This is accomplished using electronic signals from the joystick to take control of the shift, throttle and steering equipment and operate them as required to totally control the boat with one easy-to-use device.

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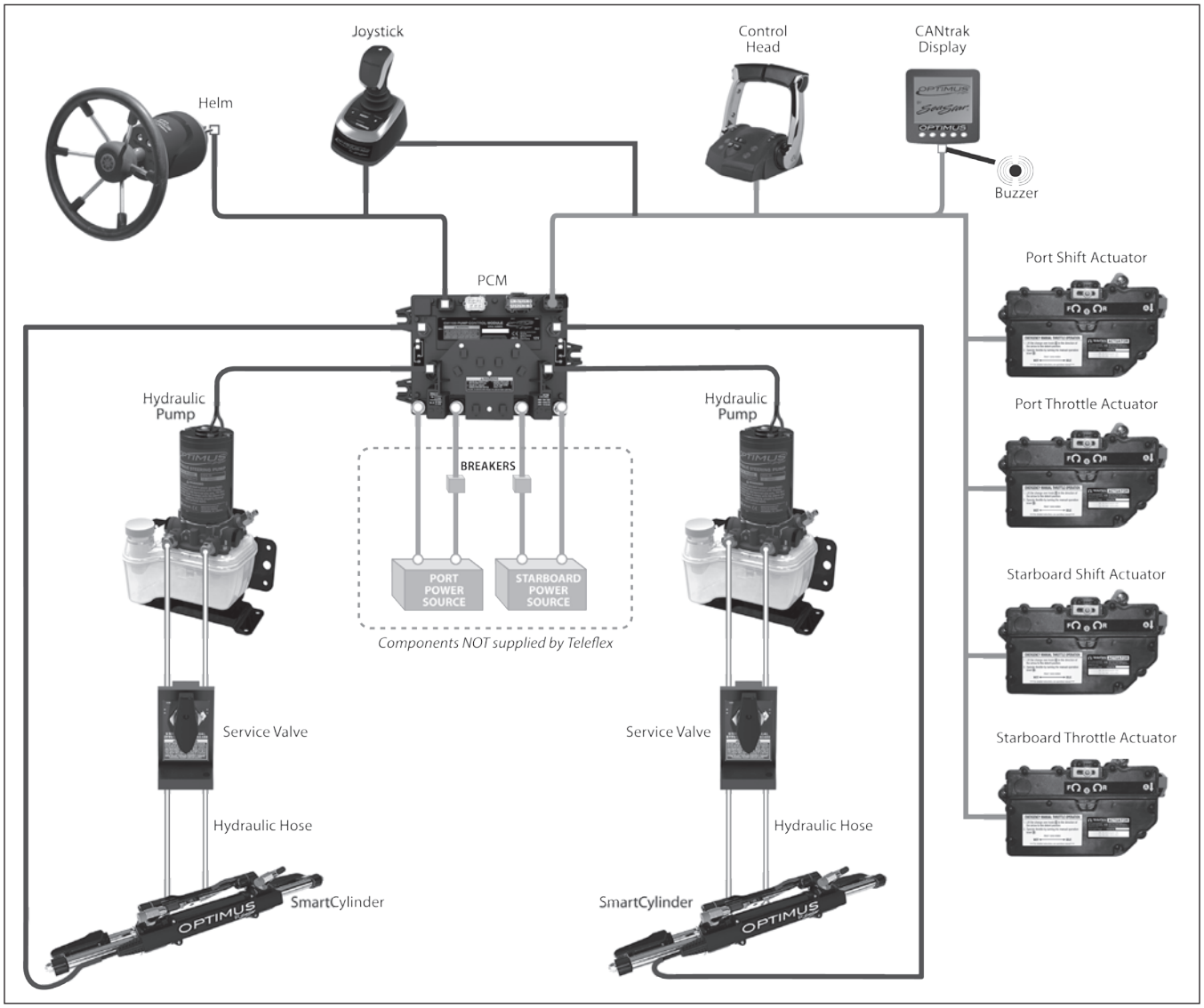
2.2 Optimus 360 System Overview (continued)

A CANtrak display shows system operation and fault warnings. The CANtrak display also permits system sensitivity and configuration adjustments.

The Optimus 360 system exceeds ABYC safety standards and includes many advancements to make the system as failsafe as possible. These include redundant sensors, fault-tolerant communications, self-monitoring and fault communications to notify and advise the operator in case of fault.

2.3 Optimus 360 System Diagram



3.0 COMPONENT IDENTIFICATION

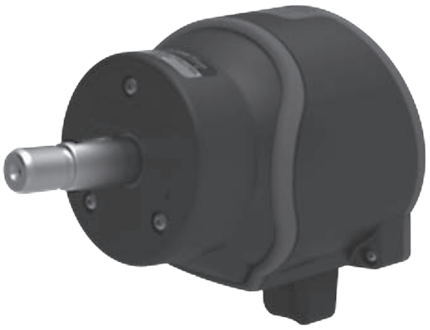
3.1 Electronic Helm(s) (EPS System)

The electronic helm is the primary user interface for conventional steering control. When in conventional steering control, ALL helms on the boat are active and can steer the boat.

The steering wheel is attached to this unit and it may be located immediately under the wheel or just behind the dash panel. The images below show typical helms.

Refer to Section 4.0 for steering operation.

EPS Front Mount Helm



EPS Sport Plus Tilt Helm

EPS Classic Tilt Helm

EPS Rear Mount Helm

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3.2 Control Head (EST System)

The control head is the primary user interface for conventional shift and throttle control.

The control head operates the gear shift and the throttle for each engine. This is accomplished using electronic signals to direct individual actuators for each function and each engine. The control head also allows various features like sync and trolling to be selected.

On single helm station boats the shift and throttle control head takes command when the ignition is turned on and the handles are in the neutral position. The blue Take Command light will come on solid when active.

For more detailed control head operation, refer to Section 4.0.

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3.3 Joystick

The joystick is the primary user interface for joystick control.

The joystick interfaces with the steering system and with the shift and throttle system. It integrates the two systems together so as to have complete boat control that is very intuitive from a single device. The joystick can only take control of the vessel when the shift and throttle control head is at neutral idle.

See Section 6.0 for detailed Joystick operation.

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3.4 CANtrak Display

There is a display at each helm station that shows the system status and allows system adjustments.

See Section 7.0 for CANtrak usage.

3.5 Circuit Breakers for Optimus 360 System and Shift and Throttle Control System

These are supplied by the installer and may be mounted in a variety of locations. Check near the batteries, in the circuit breaker box, or near the Pump Control Modules or Hydraulic Pumps. There should be two 60 amp breakers for each PCM and a 25 amp breaker for each pair of shift and throttle actuators.

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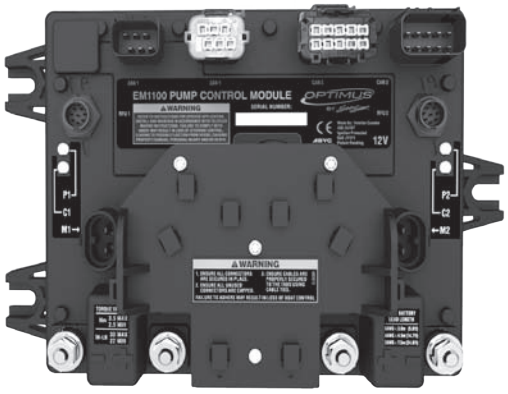
3.6 Pump Control Module (PCM)

This is located in a dry area and can usually be found inside the center console, in the area behind the dash, or in a compartment near the engines or batteries. The PCM is always located close to the Hydraulic Pumps. There will be one PCM on twin engine boats and two PCM's on triple or quad engine boats. The PCM controls the steering and Joystick operation.



3.7 Hydraulic Steering Pumps

The Hydraulic Steering Pumps supply pressurized fluid to the SmartCylinders to steer the engine and are located near the PCM. They can usually be found in a compartment near the engines, the center console or behind the dash. There is one pump for each engine. Note: these pumps look a lot like the trim pumps that tilt the engines but can be distinguished by the decal and the green/blue SeaStar Electronic Power Steering Fluid. The pumps have the steering fluid reservoir and this is where the fluid level is checked and steering fluid is added.

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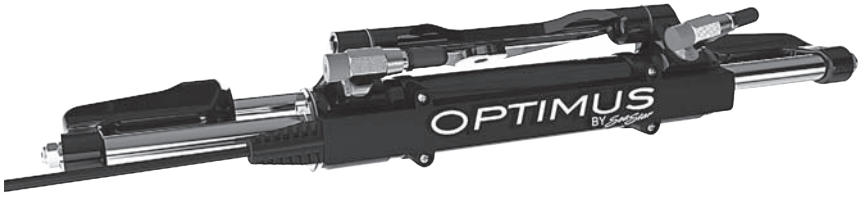
3.8 SmartCylinders

On outboard boats these are always located just below the engine cowling and are attached to the engine tiller arm. There will be one SmartCylinder for each engine and they provide steering.



3.9 Steering Service Valves

These are located in the hydraulic lines that go from the Hydraulic Pumps to the SmartCylinders. There is one for each engine. These are used for servicing and emergency operation.

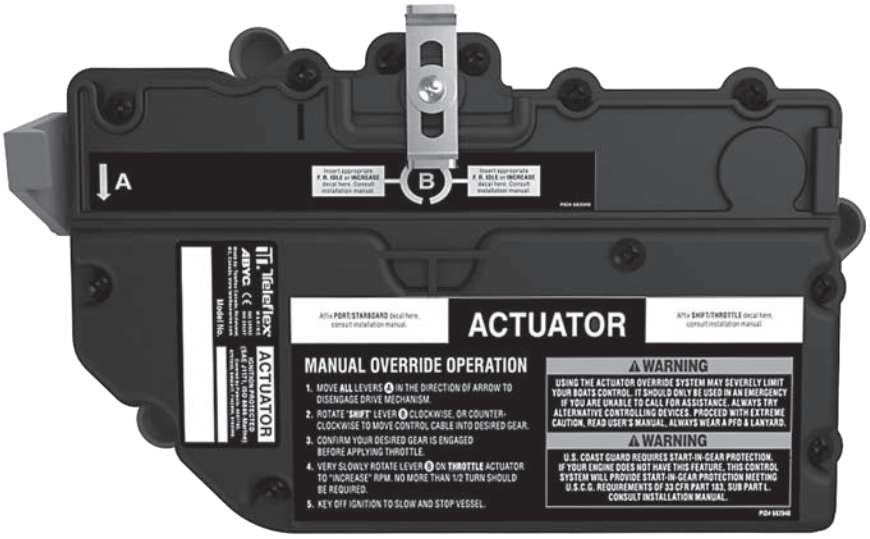
The steering service valves permit the bypass of the EPS system and allow the engines to be manually positioned. They should only be used in the event of an EPS system failure. Instructions on how to proceed will be supplied on the CANtrak display or in Section 10.2.

⚠ WARNING

Wear a coast guard-approved personal flotation device (PFD) when manually realigning engines.

3.10 Shift and Throttle Actuators

There is a shift actuator and a throttle actuator for each engine. The actuators receive electronic signals from the shift and throttle control head and position the engine control levers. There is a manual override feature on the actuators so the engine can be operated manually in case of a fault.


A
B
Teleflex
ACTUATOR
ACTUATOR
MANUAL OVERRIDE OPERATION
1. MOVE ALL LEVERS A IN THE DIRECTION OF ARROW TO DISENGAGE DRIVE MECHANISM.
2. ROTATE "SHIFT" LEVER C CLOCKWISE, OR COUNTER-CLOCKWISE TO MOVE CONTROL CABLE INTO DESIRED GEAR.
3. CONFIRM YOUR DESIRED GEAR IS ENGAGED BEFORE APPLYING THROTTLE.
4. VERY SLOWLY ROTATE LEVER B ON THROTTLE ACTUATOR TO "INCREASE" RPM. NO MORE THAN 1/2 TURN SHOULD BE REQUIRED.
5. KEY OFF IGNITION TO SLOW AND STOP VESSEL.
WARNING
USING THE ACTUATOR OVERRIDE SYSTEM MAY SEVERELY LIMIT YOUR BOATS CONTROL. IT SHOULD ONLY BE USED IN AN EMERGENCY IF YOU ARE UNABLE TO CALL FOR ASSISTANCE. ALWAYS TRY ALTERNATIVE CONTROLLING DEVICES. PROCEED WITH EXTREME CAUTION. READ USER'S MANUAL. ALWAYS WEAR A PFD & LANYARD.
WARNING
U.S. COAST GUARD REQUIRES START-IN-GEAR PROTECTION. IF YOUR ENGINE DOES NOT HAVE THIS FEATURE, THIS CONTROL SYSTEM WILL PROVIDE START-IN-GEAR PROTECTION MEETING U.S.C.G. REQUIREMENTS OF 33 CFR PART 183, SUB PART I. CONSULT INSTALLATION MANUAL.

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4.0 STEERING SYSTEM OPERATION

The steering portion of the Optimus 360 system provides fingertip steering control of multiple high-powered engines. The system provides both power and the adjustment of a number of parameters so the operator has perfect boat response under all conditions.

The system will power on with the ignition switch and operate much like a conventional steering system except the feel will be extraordinary and the effort just perfect for the conditions providing just the right amount of response and pressure.

The CANtrak display will provide the status of the steering system and supply information in the event of a fault.

On multiple helm station boats, all helms are active when the steering is on just like with conventional steering.

The dealer that installs the system will make the necessary adjustments at the time of installation to achieve exceptional steering performance. The operator may further refine the feel using the CANtrak display. See Section 7.4.3.

The quick reference steering guide provided with the system gives summary and reminder information about the steering system and should be kept at the primary helm station at all times.

The system may be connected into an autopilot to further enhance the boating experience. See Section 9.3.

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5.0 CONTROL HEAD OPERATION

⚠ WARNING

Be very cautious when first engaging the gears to establish that forward is truly forward and reverse is truly reverse. A quick in-and-out of gear test is recommended. Ensure that the boat is clear of all obstacles forward and aft before conducting this test.

The control head is the primary user interface for conventional shift and throttle controls.

On single control station boats, when the ignition is turned on, the blue Take Command light will illuminate, indicating that the control head is active. If the control levers are not in neutral, both neutral indicator lamps will flash red.

On multi-control station boats, when the ignition is first turned on, the control head “Smart Select” feature will automatically activate the control head if the levers are moved out of the neutral position. Alternately, pushing the Take Command button with the control handles in the neutral position will activate the desired station.

When in joystick mode, the control head will become inactive and all lamps will go out. The control head can be re-activated at any time by pressing the Take Command button with the control handles in the neutral position.

When transferring between joystick and control head, the control head will remember any special features such as sync mode, which may have been active prior to entering joystick mode.

The EST Quick Reference Guide provides a summary of the control head operation and should be kept on the vessel at all times.

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5.1 Identification

ENGINE TRIM CONTROL:
"Switch" in the handle. Provides simultaneous control of both engines.

LEVER POSITION INDICATORS

NEUTRAL INDICATOR LAMPS:
When the engine is in the neutral idle position, the lamps go steady green.

INDICATOR DIMMING FEATURE:
With the control head active, push **TAKE COMMAND** button again and ALL lamps will dim. There are five degrees of brightness from which to choose.

NOTE: Indicator Dimming is only accessible from the active control station. (Blue lamp on steady.)

TAKE COMMAND BUTTON:
Press the TAKE COMMAND button to activate this control head.

NOTE: Station Protection may be turned on. See Appendix B.

A lit **blue** TAKE COMMAND lamp indicates a station is active.
- On single station boats, station selection is automatic.
- For multi-station boats, choose a station and then press TAKE COMMAND button with levers in neutral.

To Change Control Head Stations (on multiple station boats):
- Move to new station and press TAKE COMMAND button. (Blue lamp flashes.)
- Match control handle positions with those of active station. (Blue lamp goes steady when levers match and this station is now in control.)

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5.1 Identification (continued)

NEUTRAL THROTTLE WARMUP (NTW):

A fast flashing **green** N (Neutral) lamp indicates NTW engaged for this engine. ☼ Allows throttle control without gear engagement.

TO ENGAGE Neutral Throttle Warmup:

- Move engine's lever to the "Neutral" position. Green lamp goes steady. ●
- Press the N (Neutral) button next to this lever. (the N lamp flashes **green** five times per second.) ☼

TO DISENGAGE Neutral Throttle Warmup:

- Return engine's lever to the "Neutral" position.
- Press N (Neutral) button next to this lever. The N (Neutral) lamp will go steady - NTW is disengaged and the engine and transmission will now respond to lever commands. ●

TROLLING MODE (TM):

- Slow flashing **green** N lamps indicate that trolling mode is engaged (one second on, two seconds off). ☼
- Provides greater throttle sensitivity: moving an engine's control lever to FULL FORWARD will only produce a percentage of WOT. (Default TM throttle limit is 25%).

TO ENGAGE Trolling Mode:

- Move one or both engine's control levers to the forward idle or reverse idle positions. The other engine's lever must be in the same position or in Neutral).
- Press either of the N buttons. Both N lamps will flash **green** slowly – TM is engaged. ☼

TO DISENGAGE Trolling Mode:

- Move both engines' control levers to forward idle or reverse idle position.
- Press either of the N buttons. The flashing **green** lamp will go out – TM is disengaged. ○

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5.1 Identification (continued)

POWER TRAIN SYNC (PTS):

Automatically synchronizes engines and transmissions; the port lever controls throttle and shift of both engines across the entire control range.

A lit **blue** SYNC lamp indicates sync is engaged. ●

To Engage Power Train Sync:

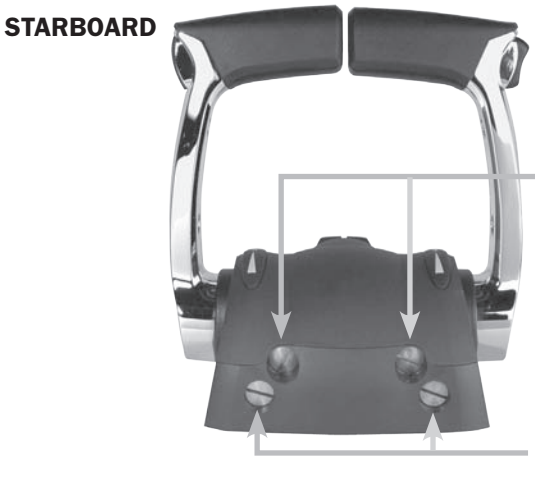
- Press SYNC button. (**Blue** lamp flashes.) ☼
- Match control handle positions within 5% of each other. (**Blue** lamp goes steady when levers match – power trains are now in sync.) ●

To Disengage Power Train Sync:

- Press SYNC button. (**Blue** lamp flashes.) ☼
- Match control handle positions within 5% of each other. (**Blue** lamp goes off when levers match – PTS is now disengaged.) ○

ADJUSTABLE LEVER FEEL

Turning in (clockwise from front) tightens the adjustment and backing out (counter-clockwise from front) loosens the adjustment.



⚠ WARNING

If a danger or warning is caused by the control system, the control head neutral lights will flash red. See Section 10.

6.0 JOYSTICK OPERATION

The joystick is the primary user interface for the Joystick Control System. It offers the ultimate control of the vessel for docking and maneuvering at slow speeds and is especially useful in confined or difficult circumstances. It is quite intuitive to use as the boat follows the actions of the handle. This section of the manual gives a detailed description of all of its capabilities and how to get the maximum benefit from this powerful feature. The Joystick 360 Quick Reference Guide, provided with the system, gives summary and reminder information on its operation and should be kept on the vessel at all times.

The joystick is spring loaded so it always returns to its center position. When the joystick is active and in the center position, the engines are in neutral and the throttles are at idle.

The joystick Take Command button will make the joystick active and shut off the control head when it is pushed. The shift and throttle controls must be in neutral to engage the joystick. When the joystick is active, the Take Command light will be solid blue and the control head lights will turn off.

While the joystick is active, the steering wheel will stiffen to prevent usage and remind the user that it is disengaged.

The Boost button increases the engine RPM when pressed. It may be activated any time the joystick is active.

Note: The A and C buttons are reserved for future use and not active at this time.

NOTICE

While the joystick is active, the steering wheel will stiffen to prevent usage and remind the user it is disengaged.

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6.1 Joystick Fundamentals

Handle Motion

The handle can be moved in any direction or rotated left or right. When released the stick will always snap back to center and put the engine in neutral idle.

Moving the handle away from center or rotating it will cause the engines to shift into the correct gear for the desired motion. Further handle motion in the same direction will apply throttle and provide more thrust in the chosen direction. The joystick is proportional and guided in each axis.

Boost Button

Increases the power the engines can apply and may be turned on or off at any time. It can be very handy when handling the boat in wind or current. The system will remember the boost mode status so if it is left on, it will be on again next time the joystick is activated.

Take Command Button

Activates the joystick and allows the joystick to take control of the vessel. The joystick can only take control of the boat when the control head levers are both in the neutral idle position.

A and C Buttons

Reserved for future use. Not active at this time.

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6.1 Joystick Fundamentals (continued)

Operation Fundamentals

The handles on the active control head must be in the neutral position before a joystick may take command of the system.

1. The joystick has three primary operational modes (see illustrations next page):
   a) **Forward/Reverse** – engaged by pushing the joystick directly fore/aft.

      Causes the boat to move directly fore and aft. In this mode, the boat can be steered by rotating the handle. Always engage the Forward/Reverse Mode by moving the handle directly fore/aft ***then*** rotating the handle to steer. Rotating the handle first ***then*** pushing fore/aft would enter Rotation Mode and apply a forward correction in rotation mode.

   b) **Sideways** – engaged by pushing the joystick directly to port or starboard.

      Causes the boat to move directly sideways. In this mode, the handle can then be moved fore/aft or rotated to correct the vessel's heading or position.

   c) **Rotation** – engaged by twisting the joystick while it is at center position.

      Causes the boat to rotate on the spot. A fore/aft handle movement ***after*** engaging rotation mode will cause the boat to rotate but with a forward or reverse bias. Always engage Rotation Mode first then apply the desired correction. Pushing the handle fore/aft ***then*** twisting would cause the system to enter Forward/Reverse mode with a steering correction.
2. When released, the joystick always returns to the center position, which provides neutral-idle for engines.
3. The joystick is proportional and guided in each axis - the more the joystick is moved, the more throttle is applied.

See the following pages for examples of each of the primary operational modes.

⚠ WARNING

In the event of an engine stall, ONLY the Forward/Reverse mode is available. Restart stalled engine or switch to conventional controls.

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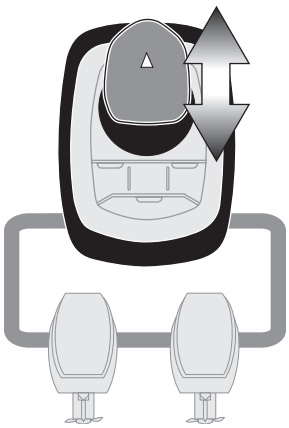
6.1 Joystick Fundamentals (continued)

a)

PRIMARY MOTION - FORWARD/REVERSE



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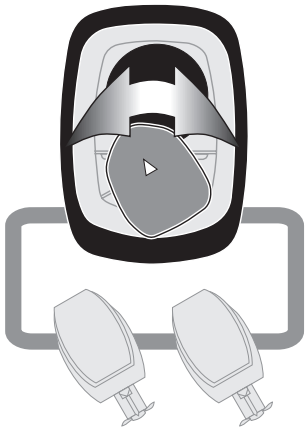
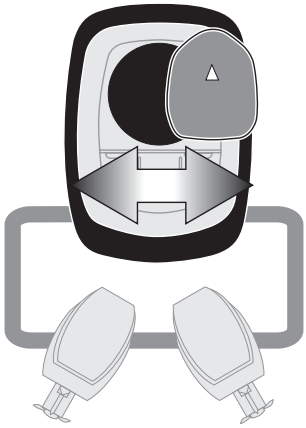
CORRECTION - ROTATE TO STEER



b)

PRIMARY MOTION - SIDEWAYS



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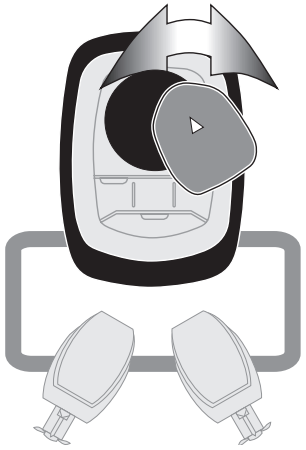
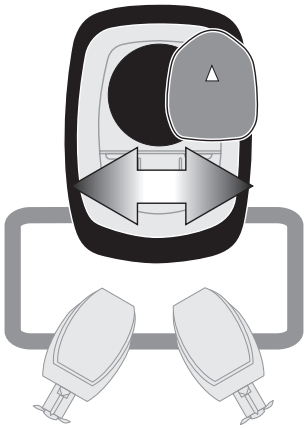
CORRECTION - ROTATE TO BIAS HEADING



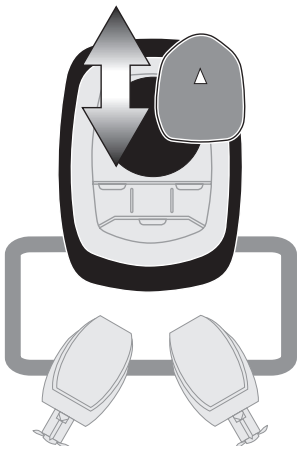
PRIMARY MOTION - SIDEWAYS



OR

+

CORRECTION - FORWARD/REVERSE TO DIAGONAL



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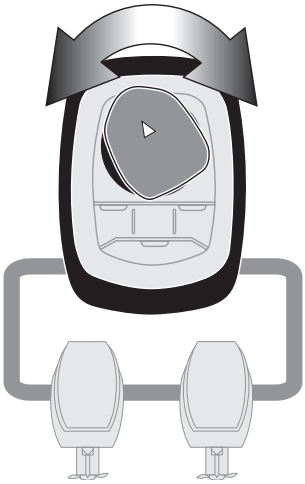
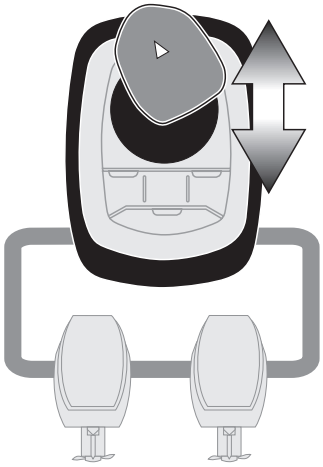
6.1 Joystick Fundamentals (continued)

c)

PRIMARY MOTION - ROTATION



CORRECTION - FORWARD/REVERSE TO BIAS ROTATION



6.2 Joystick Tips

1. Plan out your joystick maneuvers before you approach your target:
   a. Keep it simple - Minimize diagonal and other complex maneuvers. This allows for better boat correction and control.
   b. Know your boat's limitations - Be aware of wind and current, and understand the boat's movement delay due to its momentum. Some conditions may prove too strong for your engine thrust.
2. Make it clear to the system what you want to do. Do not make slight movements off of the neutral position. For example: If you want the boat to move to port, move the joystick well along the port axis.
3. Moving the handle port/stbd will move the boat sideways, but will not steer the boat (change heading). Twisting (rotating) the handle steers and rotates the boat (see illustrations previous page).
4. It is recommended to return to the center position when switching between primary operational modes.
5. Practice joystick maneuvers in open water before attempting close quarters docking. This will help you understand the primary operational modes and how they control your boat.

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6.2 Joystick Tips (continued)

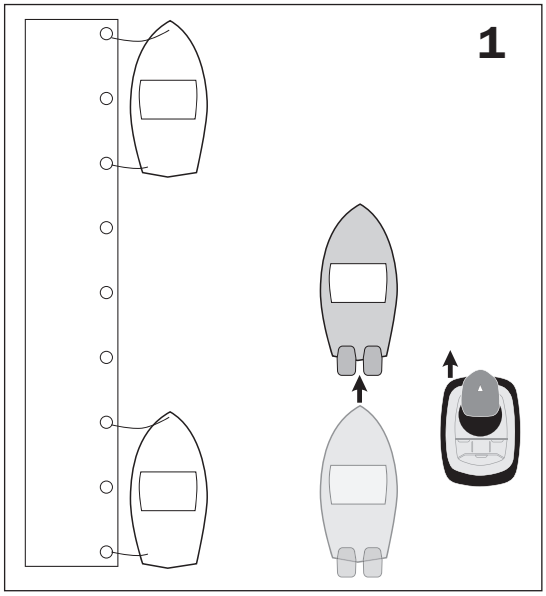
6. There is a momentary shift delay built into the system when returning from any gear activity to neutral. This allows bumping the handle to get a little more motion in the same direction without causing excessive engine shifting. This delay is removed if the action passes the home area in the opposite direction so you can stop the boat immediately if needed.
7. The control head must be active at the helm station with the joystick that will be used and the control handles must be in neutral and idle at that station.

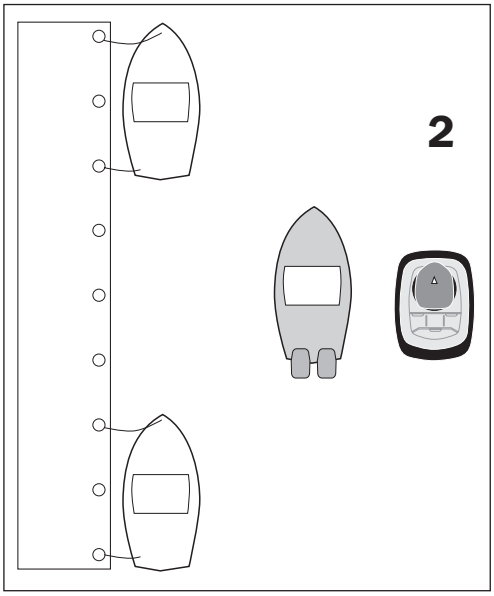
6.3 Joystick Operation Examples

Example 1

Make the primary action move first and then adjust the boat motion with a secondary joystick motion. Example: the boat is parallel to the dock and you wish to move the boat against the dock. This is like parallel parking a car.

1. Move the boat forward or backward with direct forward or backward joystick motions until the boat is stopped and centered in the location on the dock you wish to approach.
2. Return the joystick to the center position.





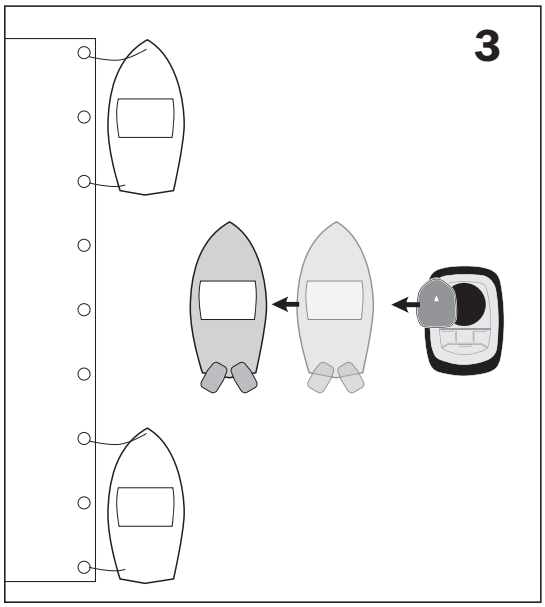
6.3 Joystick Operation Examples (continued)

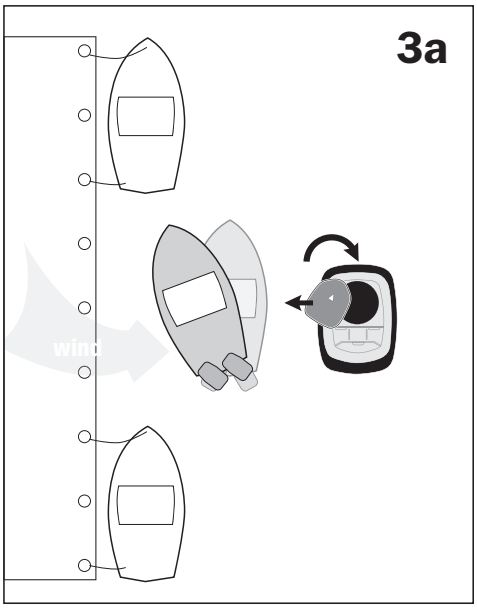
3. Move the joystick directly port to approach the dock.

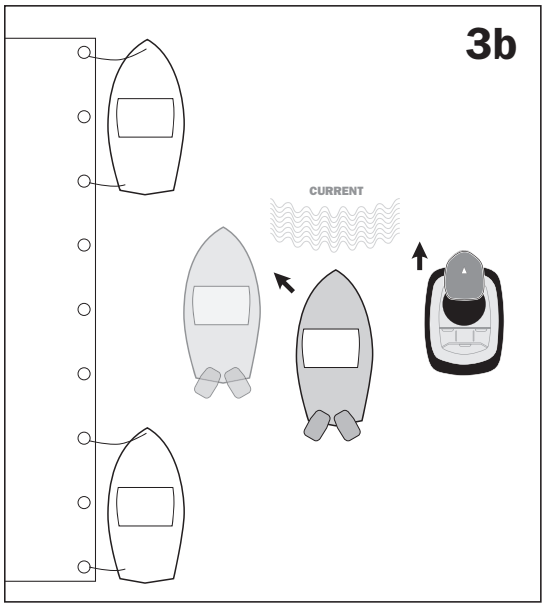
3a. If the boat does not stay parallel due to wind or current while holding the joystick to the side just rotate the joystick to keep the boat parallel to the dock during the approach.

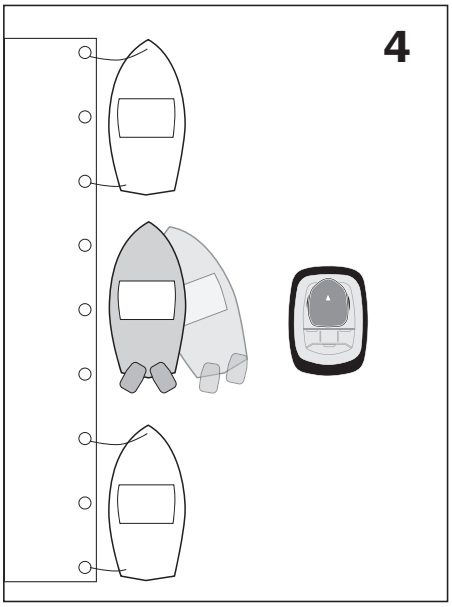
3b. If the boat does not stay centered due to wind or current while holding the joystick to the side, just push or pull the joystick fore/aft to correct.

4. Once close to the dock, return the joystick to the center position.









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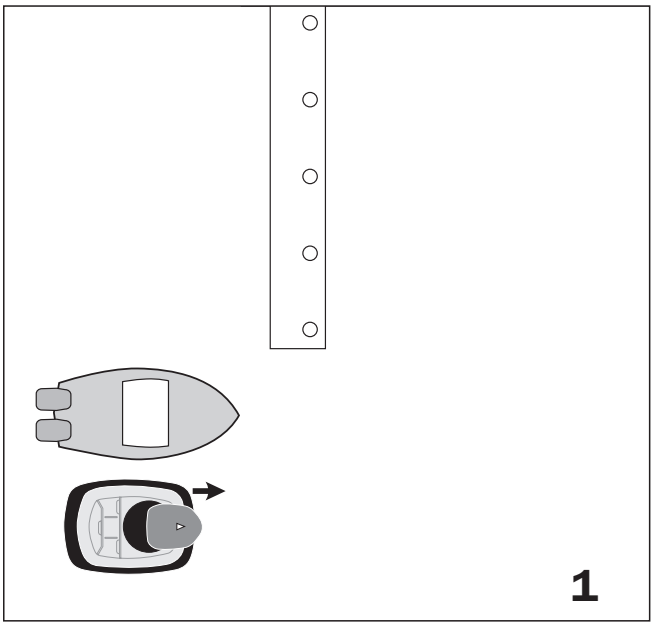
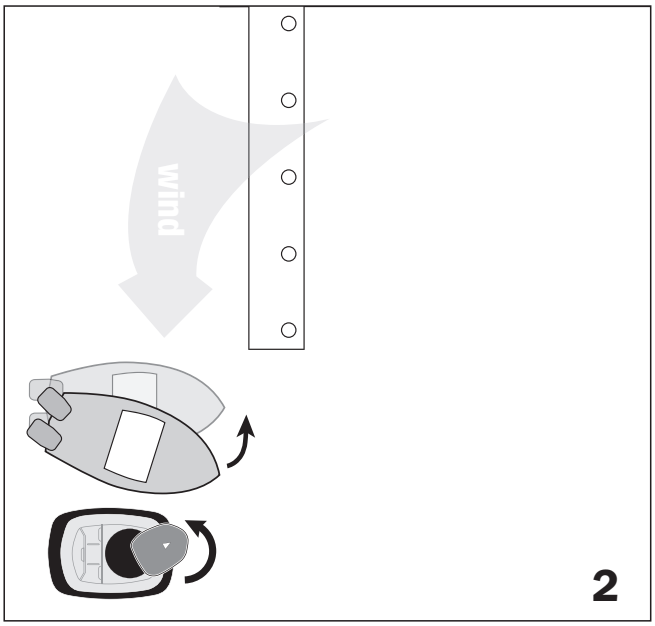
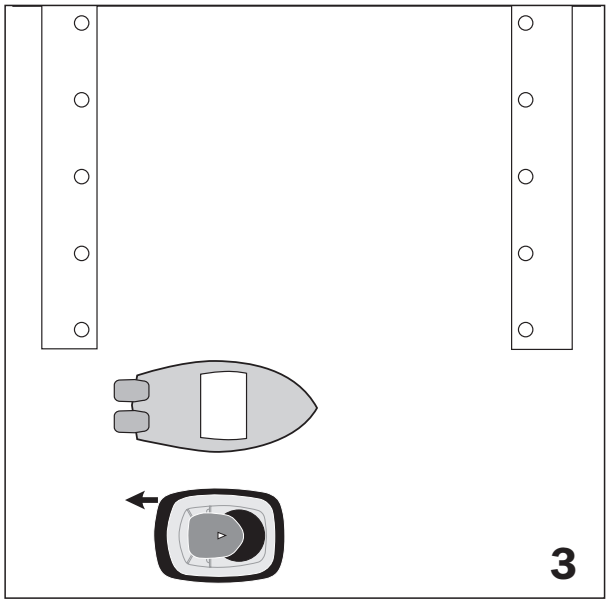
6.3 Joystick Operation Examples (continued)

Second Example

1. Move the boat forward by pushing the joystick forward.
2. With the joystick forward and the boat moving forward rotate the joystick as needed to correct for wind or current. Return the joystick to the home position as you near the slip.
3. As the boat approaches the slip pull the joystick backwards to stop the boat in front of the slip. Return the joystick to the home position when the boat stops.

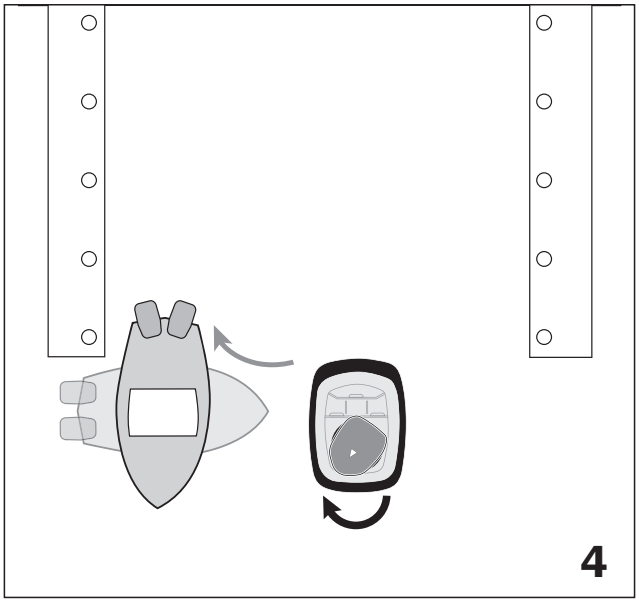


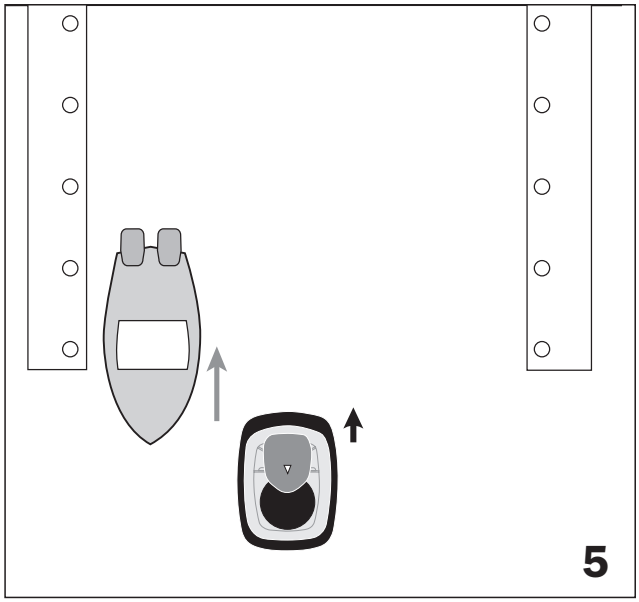


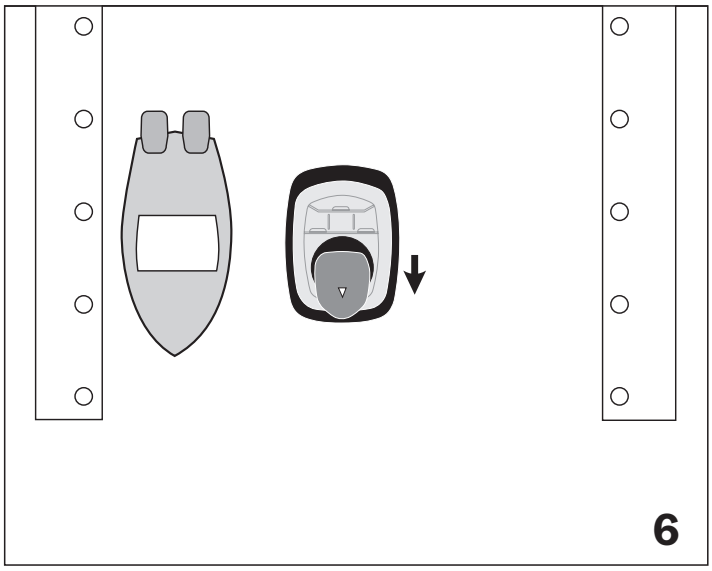


6.3 Joystick Operation Examples (continued)

4. Rotate the joystick to turn the boat and align it with the slip. Use a straight port or starboard move of the joystick if necessary to realign the boat.
5. Pull the joystick back to move the boat into the slip.
6. A short bump forward on the joystick will stop the boat in position.







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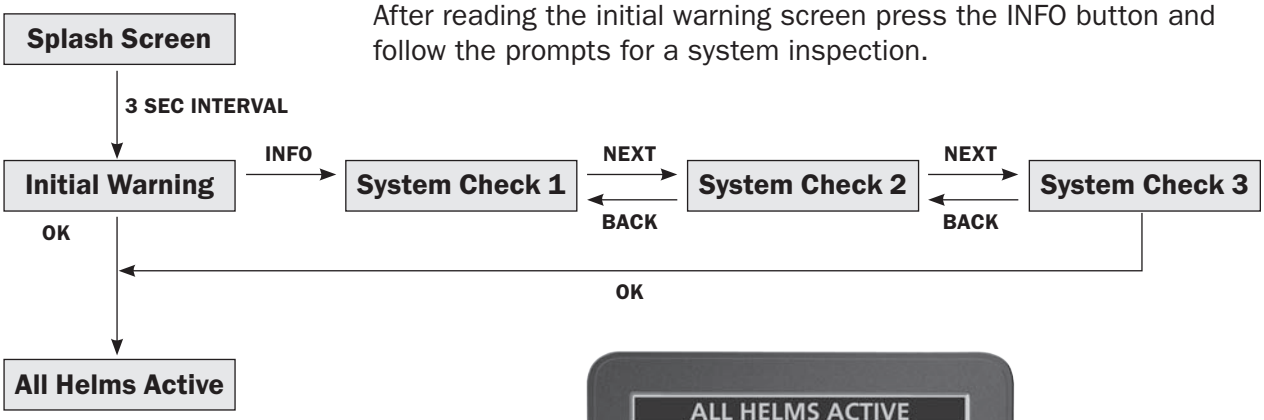
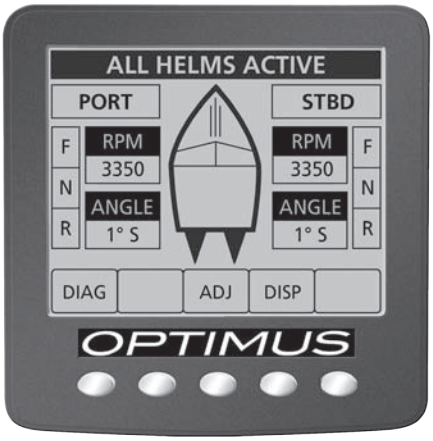
7.0 CANtrak DISPLAY

Turning on the ignition switch will turn on the Optimus 360 system. The CANtrak Display will turn on and the steering will become active at **ALL** helms. For First Time Use, please see Section 8.0.

WARNING
FAILURE TO ADHERE TO THESE WARNINGS MAY RESULT IN LOSS OF BOAT CONTROL, EJECTION, PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH. PERFORM SYSTEM INSPECTION. CHECK FLUID, STEERING/ THROTTLE RESPONSE, INSPECT ITEMS FOR WEAR/LEAKS. PRESS INFO FOR MORE DETAIL ON SYSTEM INSPECTION. PRESS OK TO CONFIRM COMPLETION.
INFO
OK
OPTIMUS

After reading the initial warning screen press the INFO button and follow the prompts for a system inspection.



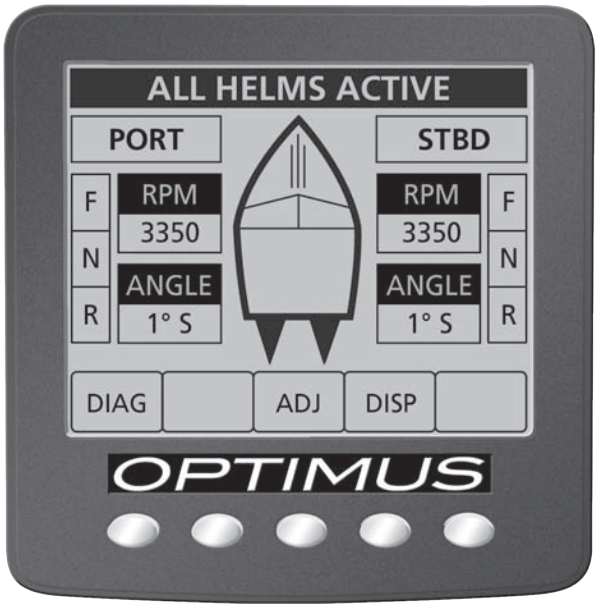


⚠ WARNING

On multiple helm station boats, all helms are active when the Optimus 360 is turned on. This is the same you would find on a conventional hydraulic steering system.

7.1 Purpose

The Optimus 360 CANtrak display has an easy to navigate menu system, adjustable backlighting for night use and includes a cover to protect it from the sun when not in use.



The CANtrak display serves these purposes:

1. Displays the current system operating conditions.

2. Handles system faults by:

a) Displays system warnings in case of a system fault.

b) Sounds an audible alarm in case of a system fault.

c) Instructs the operator what to do in case of a system fault.

3. Permits changes to the basic system settings.

4. Provides system and diagnostic information

For details on CANtrak operation see Sections 7.2 through 7.4 of this manual.

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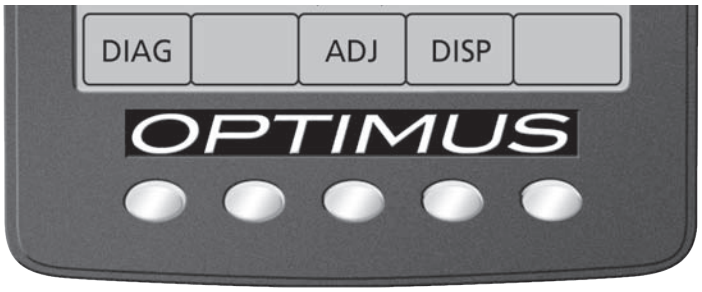
7.2 CANtrak Display Navigation

The five buttons at the bottom of the unit are used to select various actions. The five boxes at the bottom of the display screen will indicate the legend for each button. These legends vary based on what is on the screen.



WORD OR SYMBOL	IDENTIFIES A FUNCTION OR SETTING
⬆	Moves the cursor arrow up the screen to the next item
⬇	Moves the cursor arrow down the screen to the next item
➡	First press selects the parameter to change and subsequent press index the selection
⬅	Takes you back one step
▬	Reduces the setting of a selected item
✚	Increases the setting of a selected item
OK	Accepts a given statement or condition and advances to the next screen
	Moves the unit back one level.
	CANtrak display lighting
	CANtrak display contrast

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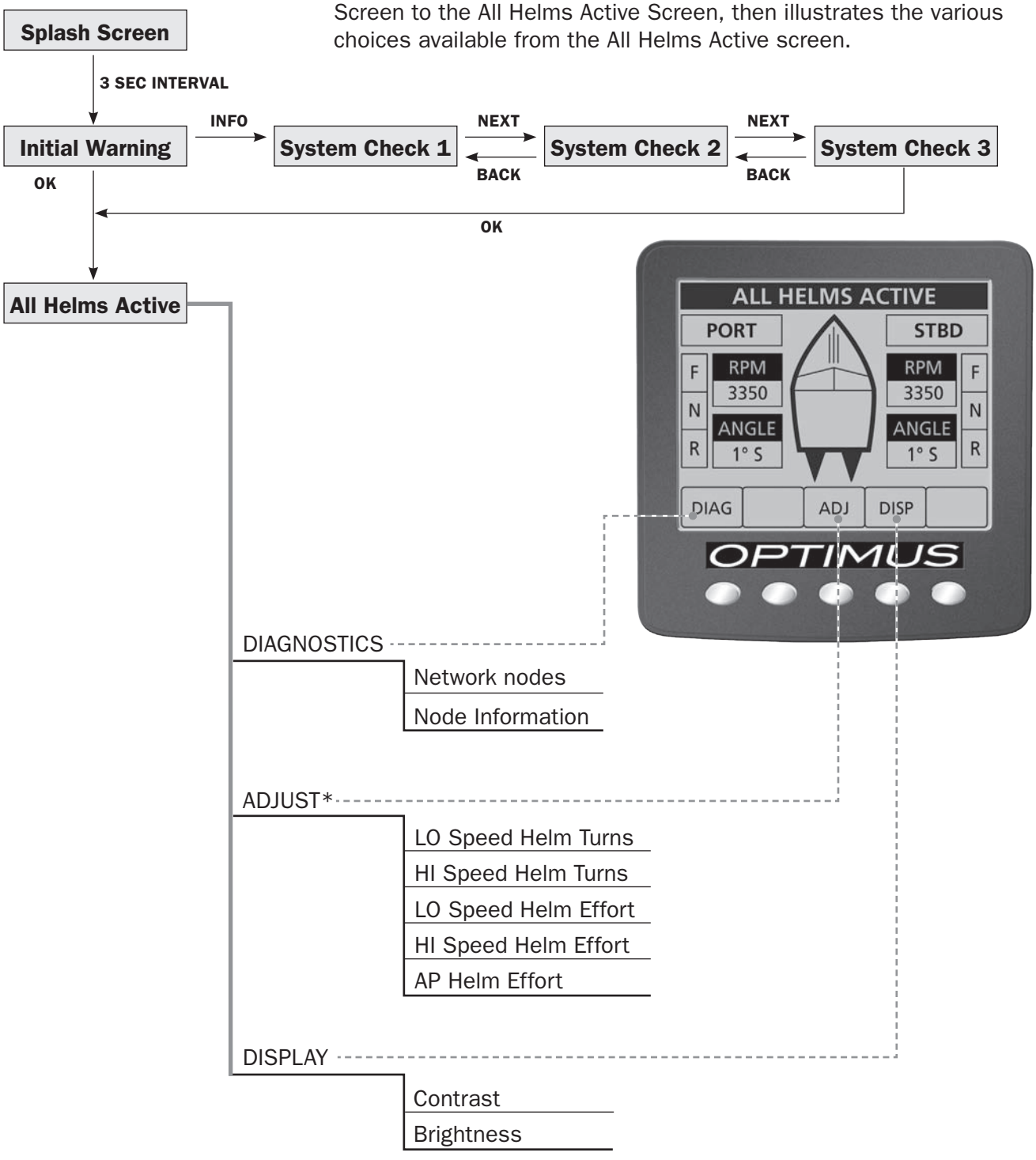
7.3 CANTrak Display Map – All Helms Active (Normal Steering Mode)

The following diagram shows the progression from the Splash Screen to the All Helms Active Screen, then illustrates the various choices available from the All Helms Active screen.



* Some installations may not have this feature available. Contact dealer.

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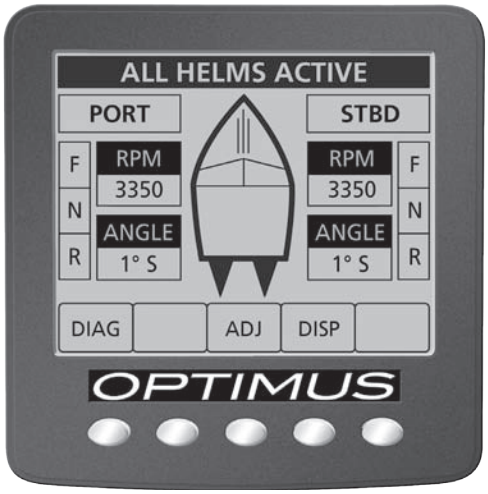
7.4 Display Screens

7.4.1 **All Helms Active** (Normal Steering Mode)

The All Helms Active Mode screen will be displayed under normal operating conditions after the startup warning has been acknowledged.

The All Helms Active screen displays the current system operating conditions. It shows the engine RPM, gear position, and rudder angle. It also allows access to the Diagnostics, Adjustment and Display menu screens.

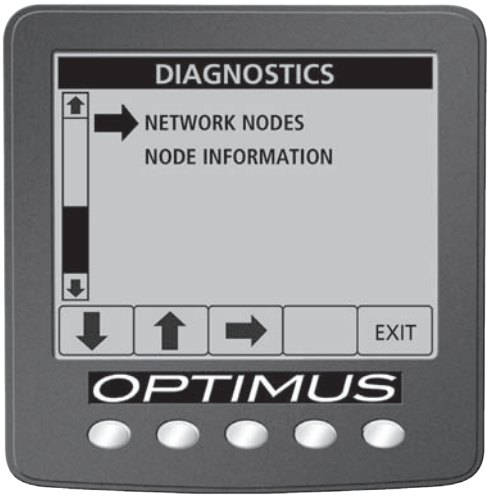


See Section 9.3 for the autopilot display screen.

7.4.2 Diagnostics (DIAG) Screen

The Diagnostics screen allows the user the access to basic system diagnostics tools including network node information and a CAN message viewer.

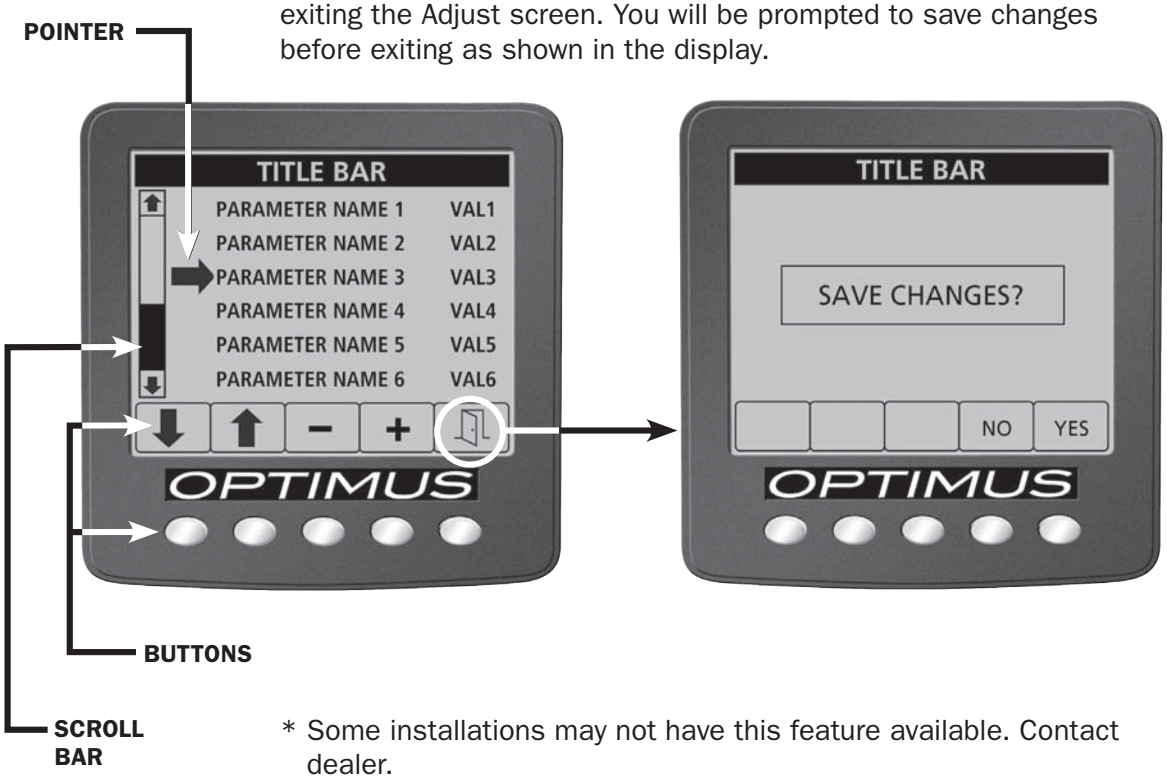
Diagnostics Screen



7.4.3 Adjust (ADJ) Screen*

The Adjust screen allows adjustment of system parameters which affect steering operation and feel. Specific details of each parameter are listed below.

Changes made in the Adjust screen are saved to memory upon exiting the Adjust screen. You will be prompted to save changes before exiting as shown in the display.



* Some installations may not have this feature available. Contact dealer.

Low Speed Turns

This setting changes the number of turns when the vessel is running at low speeds. The adjustable range is 3.5 to 8 Turns.

High Speed Turns

This setting changes the number of turns when the vessel is running at high speeds. The adjustable range is 3.5 to 8 Turns.

Low Speed Steering Effort

This setting changes the steering resistance when the vessel is running at low speeds. It is adjustable between 1 and 100.

High Speed Steering Effort

This setting changes the steering resistance when the vessel is running at high speeds. It is adjustable between 1 and 100.

Autopilot Engaged Steering Effort

This setting increases the steering resistance slightly when autopilot is engaged to prevent accidental course corrections with the wheel. It is adjustable between 0 and 100.

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7.4.3 Adjust (ADJ) Screen (continued)

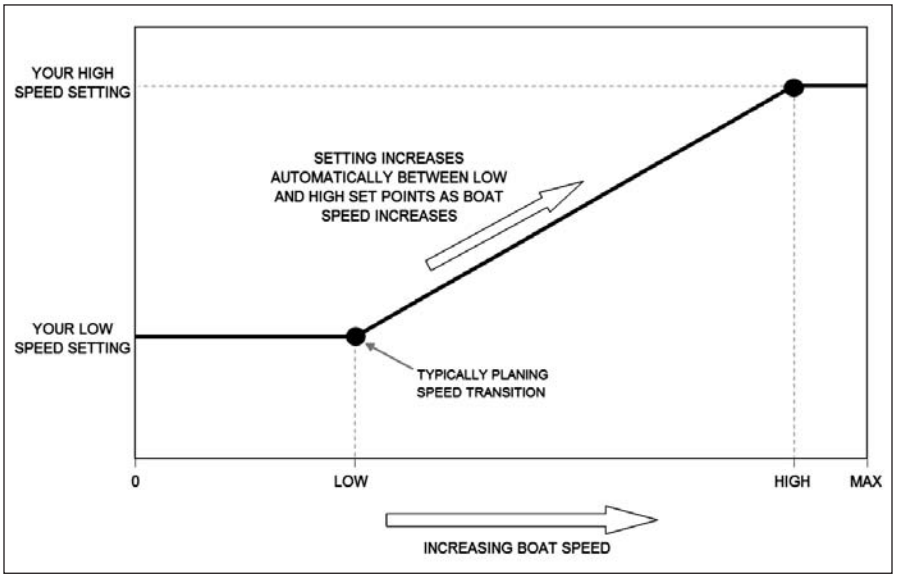
NOTICE

The steering resistance and turns have both low speed and high speed settings. The low speed and high speed set points may be determined by various sources, for example: Engine RPM, Throttle Position, etc. These are configured by your dealer and are not adjustable.

The number of turns and steering resistance at these low and high speeds are user adjustable. These settings will automatically increase smoothly between the low speed and high speed points as shown below.

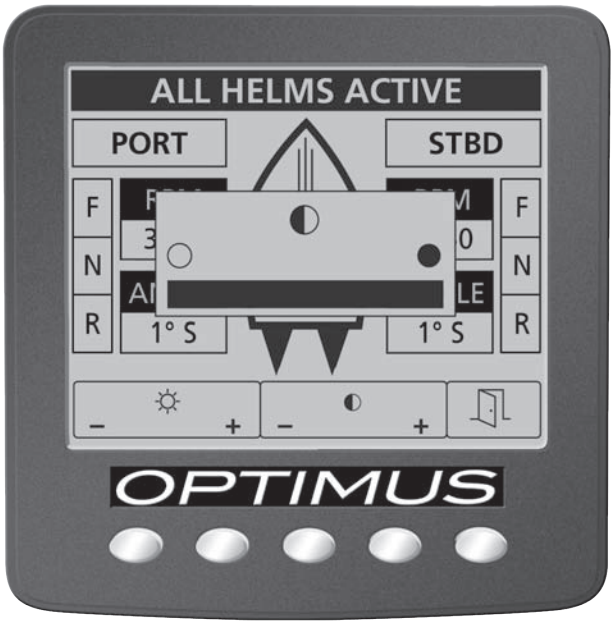
⚠ CAUTION

Adjusting steering effort for steering turns can significantly impact boat handling. Proceed with caution after making any changes.



7.4.4 Display (DISP) Screen

The Display screen allows adjustment of the brightness and contrast of the CANtrak display. These should be adjusted to provide good daytime and night time visibility of the display.



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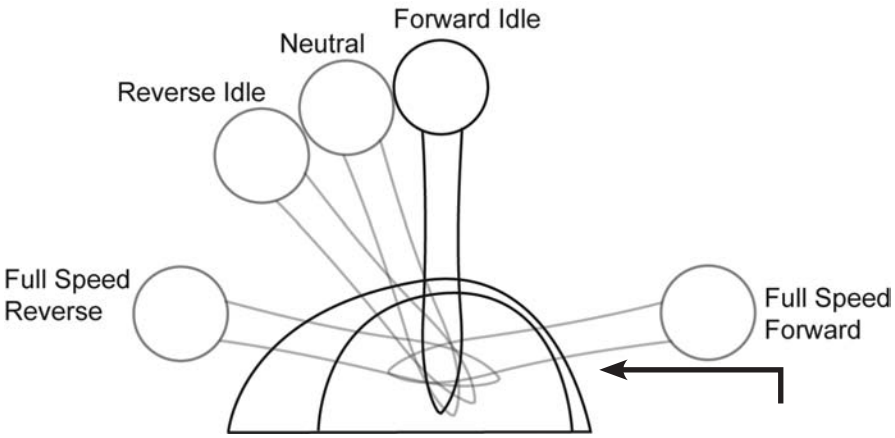
8.0 FIRST TIME USE

8.1 Control Head Adjustments

Before starting the engines for the first time, take a moment to familiarize yourself with the shift and throttle controls. With the engines not running and the control system turned off, move the control levers over the full range until you are familiar with the feel. Note that the detent pressure and drag can be adjusted using the adjusting screw on the front surface of the control head. The top screw sets the detent pressure; the lower screw sets the drag.



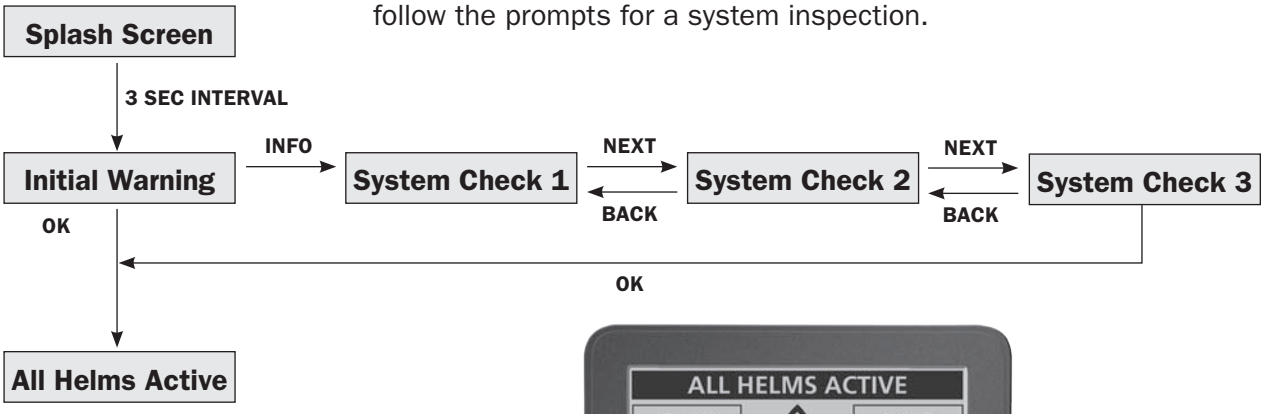
Note that the detent pressure and drag can be adjusted using the adjusting screws on the front surface of the control head.

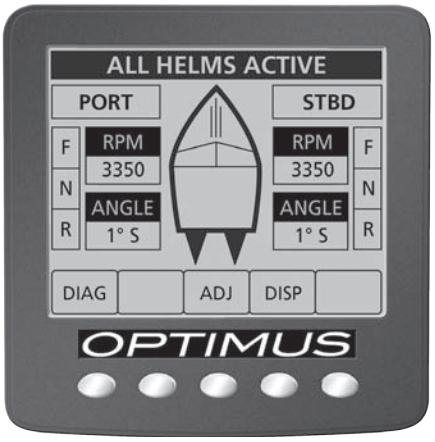
8.2 Initial Start Up

Turning on the ignition switch will turn on the Optimus 360 system. The CANtrak Display will turn on and steering will become active at **ALL** helms.

WARNING
FAILURE TO ADHERE TO THESE WARNINGS MAY RESULT IN LOSS OF BOAT CONTROL, EJECTION, PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH. PERFORM SYSTEM INSPECTION. CHECK FLUID, STEERING/ THROTTLE RESPONSE, INSPECT ITEMS FOR WEAR/LEAKS. PRESS INFO FOR MORE DETAIL ON SYSTEM INSPECTION. PRESS OK TO CONFIRM COMPLETION.
INFO
OK
OPTIMUS

After reading the initial warning screen press the INFO button and follow the prompts for a system inspection.





⚠ WARNING

On multiple helm station boats all helms are active when the Optimus 360 is turned on. This is the same you would find on a conventional hydraulic steering system.

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8.2 Initial Start Up (continued)

With the system powered up, activate the desired control head or joystick by using the Smart Select functionality on the control head or by pressing the Take Command button on the desired device. On single station vessels, the control head will automatically become active.

If a control head is selected, the control head Take Command light should illuminate solid blue and both green neutral indicator lamps should illuminate solid green. This indicates that the control head is now in control of shift and throttle and that the engines are in the neutral idle position.

If a joystick is selected, the joystick Take Command light should illuminate solid blue. The joystick now has control of the system and is ready for use.

Refer to Sections 4.0, 5.0 and 6.0 for detailed steering, control head and joystick operation.

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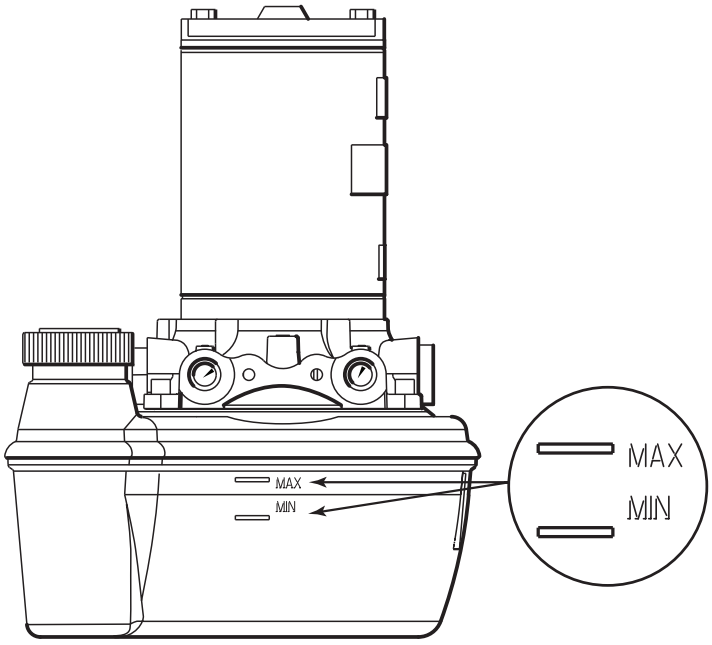
8.3 System Inspection

⚠ WARNING

Failure to adhere to these warnings may result in loss of boat control, leading to possible ejection from vessel; causing property damage, personal injury and/or death.

1. **Check steering fluid level in all steering pumps.**
   Each Optimus 360 hydraulic pump has a steering fluid reservoir. Ensure the fluid level is between the MIN and MAX marks on the reservoir as shown in the figure below. Use only SeaStar Electronic Power Steering Fluid in the Optimus 360 System.



2. **Verify immediate steering response when turning steering wheel(s).**
   Turn the steering wheel slowly to port and to starboard and make sure the engines follow the commands. Watch that the hoses harnesses, and cables move freely without any snags or hang-ups.

3. **Inspect all steering hoses, fittings and mechanical and electrical harness for wear, kinks, or leaks.**
   Check all steering hoses and fittings between the pump, service valves and cylinders for any signs of leakage, kinking, wear or chafing. Check all electrical harnesses and mechanical cabling for abrasion, wear, rubbing or chafing. Check that all connections are tight and free of corrosion.

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8.3 System Inspection (continued)

4. **Check for binding, loose, worn or leaking steering or shift/ throttle control components.**

   Check all shift and throttle cables and harnesses for signs of wear, damage or chafing. Check that all linkages and cables move freely and are not binding or corroded.

5. **Verify proper shift and throttle response for all control handles.**

   Check that all shift and throttle levers operate freely and cause the engines to shift accordingly. Put the engines in neutral idle mode and confirm that the throttle responds correctly and returns to idle.

6. **Verify that no faults or warnings are shown on the CANtrak display or the Shift and Throttle Control Head.**

   If warnings are found on the CANtrak display, follow the instructions on the CANtrak screen or refer to Section 10 before proceeding.

   Read the System Inspection steps on the CANtrak display and acknowledge them by pressing the right hand most button under OK.

⚠ WARNING

Do not operate the boat if any component is not in proper working condition.

After becoming familiar with the system inspection process, the operator can use the OK button to acknowledge that the system inspection process was understood and completed and can then go directly to the steering mode screen.

⚠ WARNING

It is recommended the full system inspection be reviewed on a regular basis to retain familiarity.

8.4 Installation Checks

To verify correct installation of the Optimus 360 SmartCylinder, perform the following installation checks when the boat is delivered and after each boat servicing.

⚠ WARNING

Failure to perform these checks may result in damage to the SmartCylinder sensor and affect the safe operation of the boat's steering.

1. **Interference Checks -** Confirm that there is no interference between the steering cylinder(s), splashwell or outboard engine or any combination of these parts by performing the steps below. At the same time for each step also check that the hoses, harnesses and cables are moving freely with no rubbing or binding (see figures below and on right page).

   a) With the engines fully tilted DOWN, turn the steering wheel from hard over to hard over and confirm that no interference occurs.

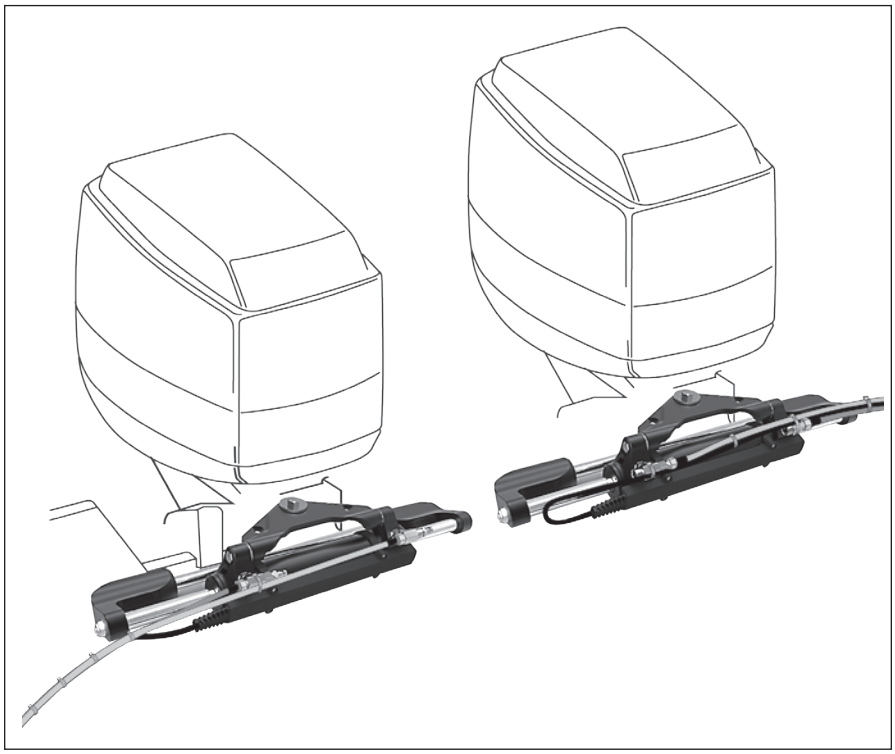
   b) With the engines fully tilted UP, turn the steering wheel from hard over to hard over and confirm that no interference occurs.

   c) Trim the port engine fully DOWN and the starboard engine fully UP. Turn the steering wheel from hard over to hard over and confirm that no interference occurs.

   d) Trim the starboard engine fully DOWN and the port engine fully UP. Turn the steering wheel from hard over to hard over and confirm that no interference occurs.

⚠ CAUTION

If any issues are found during the installation checks, immediately return the boat to the service dealer for those issues to be remedied.



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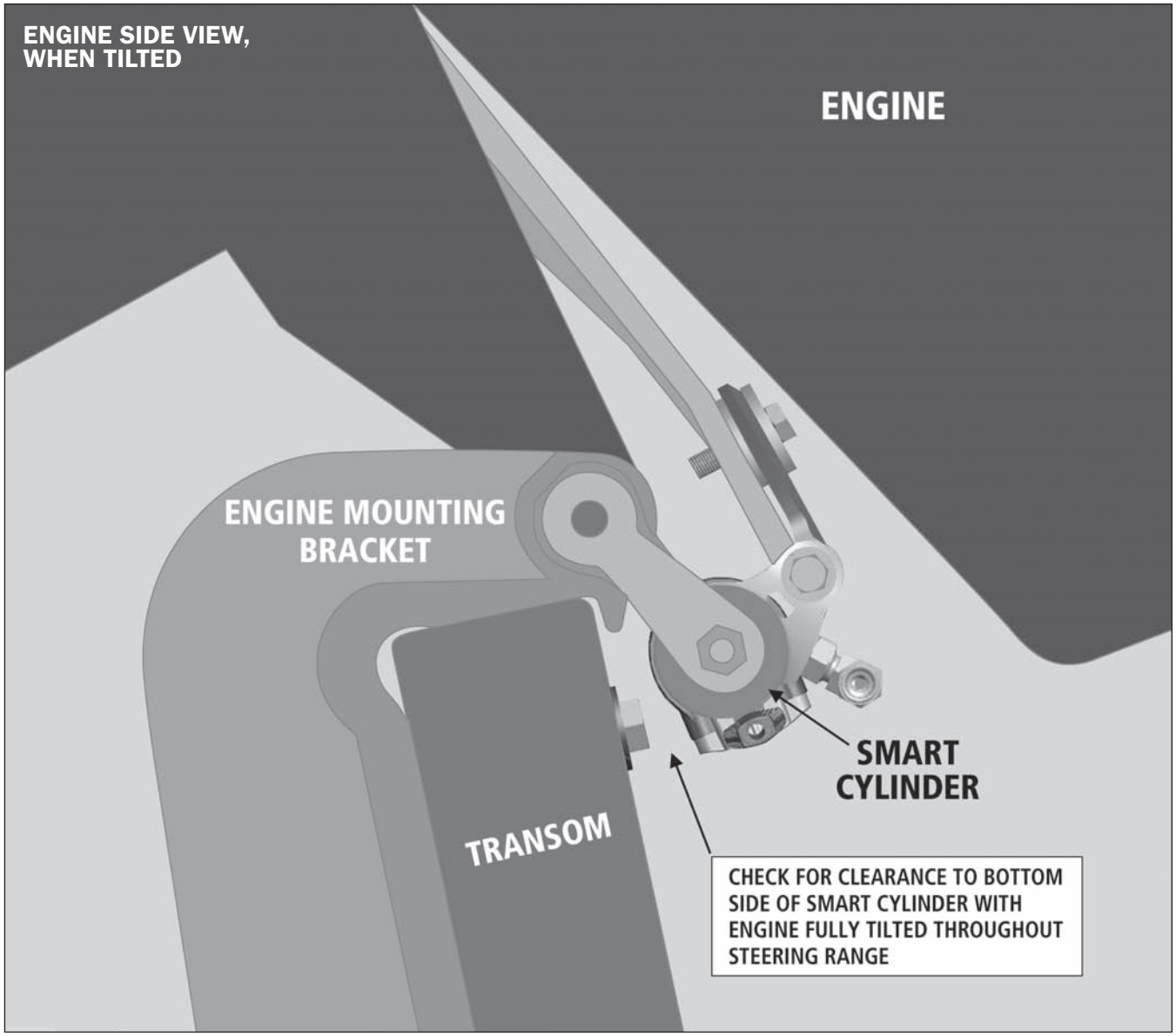
8.4 Installation Checks (continued)

Make sure that all cables, harnesses, and hoses move freely and that the cylinders and engines are clear at steering extremes.


ENGINE SIDE VIEW, WHEN TILTED
ENGINE
ENGINE MOUNTING BRACKET
SMART CYLINDER
TRANSOM
CHECK FOR CLEARANCE TO BOTTOM SIDE OF SMART CYLINDER WITH ENGINE FULLY TILTED THROUGHOUT STEERING RANGE

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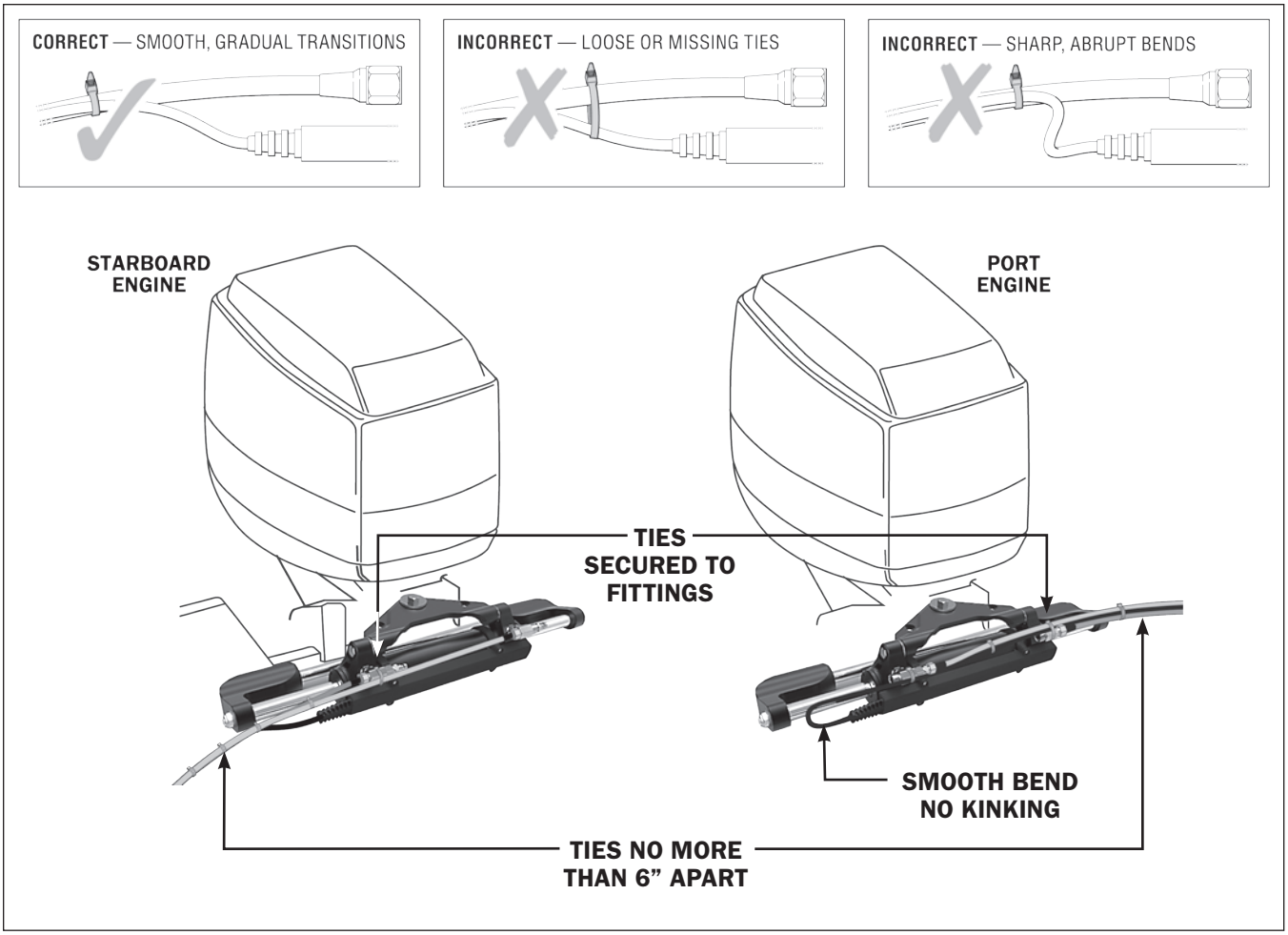
8.4 Installation Checks (continued)

2. **Sensor cable** - Confirm that the SmartCylinder Sensor Cable is tied securely to the hoses with gradual bends, and that the cable will not snag on any object during motion. See the diagram below.

⚠ WARNING

Failure to perform these checks may result in damage to the SmartCylinder Sensor and effect the safe operation of the boat's steering.


CORRECT — SMOOTH, GRADUAL TRANSITIONS
INCORRECT — LOOSE OR MISSING TIES
INCORRECT — SHARP, ABRUPT BENDS
STARBOARD ENGINE
PORT ENGINE
TIES SECURED TO FITTINGS
SMOOTH BEND NO KINKING
TIES NO MORE THAN 6" APART

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8.5 Initial Sea Trial

⚠ WARNING

With the engine lanyard properly connected to you and the passengers secure, carefully proceed to a section of deep open water at a slow to moderate speed. Use the trip to get a feel for the steering and control response. When in open water that is deep enough to assure you will not run aground try various maneuvers with the boat at various speeds until you are comfortable operating the boat.

Be sure to spend some time becoming comfortable with each of the following:

Steering – Check at various speeds and different rate turns.

Shift and throttle – Become comfortable with the handle pressure and the various features like Power Train Sync and Neutral Throttle Warm up.

Joystick – Try all the various modes and using both primary and secondary actions.

If adjustments to the system are required see Section 7.4.3 for steering adjustments or contact your dealer.

9.0 SYSTEM USE

If this is the first-time use OR for more details, see Section 8 of this manual. For detailed system operation see Sections 4 through 7.

9.1 Before Each Use

⚠ WARNING

Prior to every use:

Perform a system inspection as outlined below, see Section 8.3 for further details.

1. Check steering fluid level in all steering pumps.
2. Verify immediate steering response when turning steering wheel(s).
3. Inspect all steering hoses, fittings, mechanical cables and electrical harnesses for wear, kinks, or leaks.
4. Check for binding, loose, worn or leaking steering or shift/throttle control components.
5. Verify proper shift and throttle response for all control handles.
6. Verify that no faults or warnings are shown on the CANtrak display.

⚠ WARNING

Do NOT operate boat if any component is not in proper working condition.

9.2 Multiple Station Boats

⚠ CAUTION

On multiple helm station boats, all helms are active when the Optimus 360 is turned on. This is the same you would find on a conventional hydraulic steering system.

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9.3 Autopilot Operation

⚠ WARNING

Always read and understand the autopilot operation instruction completely before engaging the autopilot mode.

The Optimus 360 steering system is designed to interface with many autopilot controllers. See your Autopilot's documentation for specific model compatibility.

On boats with an autopilot the steering effort may be noticeably higher when the autopilot is engaged. This resistance is user adjustable, see Section 7.4.3 of this manual.

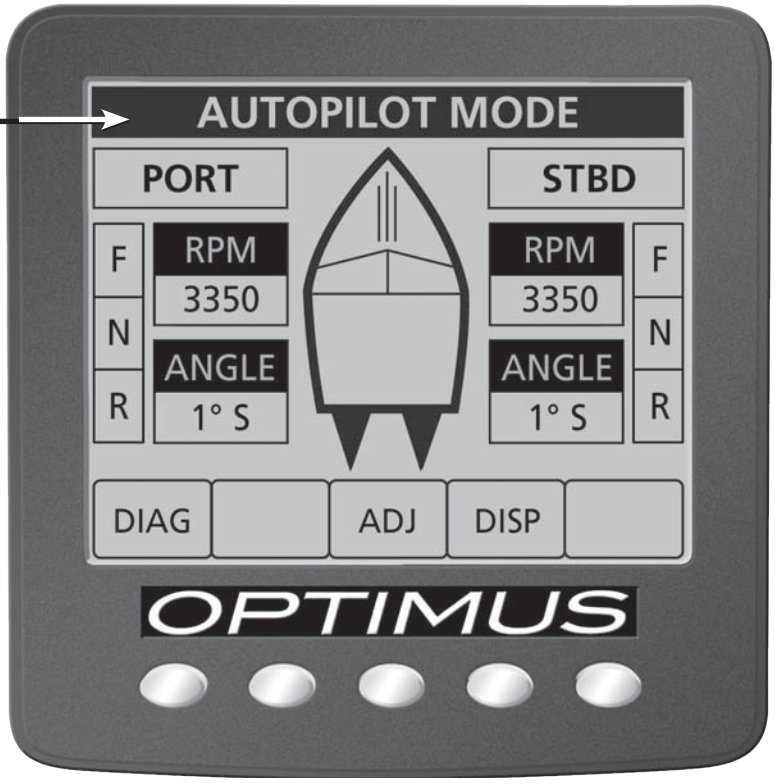
When any wheel is turned with the autopilot engaged, the helm will take control of the system and manually override the autopilot. When this happens, the steering resistance will return to normal until the autopilot re-engages. See your autopilot user's manuals for specific system behavior.

The shift and throttle control head should be active when the autopilot is operational. Do not select the joystick when the autopilot is active.

⚠ WARNING

Never leave the helm station unattended when the autopilot is engaged.

The Title Bar will display "Autopilot Mode" when the autopilot is engaged.



10.0 SYSTEM FAULTS & HAZARDS

Should a fault occur, it will be communicated to the user though the CANtrak display. Section 10.1 defines the two types of hazards you may experience with the system and how the system will handle each.

NOTICE

When a serious fault occurs, the operator should consider his or her options. While the system has many features to allow the boat to return to port in a slow and safe manner, local conditions or operator skills may dictate that calling for assistance is the prudent thing to do.

10.1 Hazard Definitions

10.1.1 Danger

A danger fault is a critical system fault which will result in limited steering and/or shift and throttle performance and requires immediate action.

Depending on the type of fault a variety of conditions might occur all designed to provide the safest situation for returning to port. Some examples are:

- Steering may be restricted to one engine.
- The engines may need to be positioned manually and the boat steered using the shift and throttle.
- The shift and throttle may require manual override with normal steering.
- The joystick may become inactive.

The system will provide the safest alternative to normal operation.

In the case of a danger fault, the CANtrak buzzer will sound continuously (until muted) and the CANtrak display will advise the operator on how to proceed. See Section 10.2.1 for danger fault handling specifics.

In the case of an EST system danger fault, in addition to the CANtrak message and buzzer, both red lights on the control head will flash red quickly (5 times per second).

In the case of a Joystick danger fault, in addition to the CANtrak message and buzzer, the joystick Take Command button light will flash red quickly (5 times per second).

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10.1.2 Warning

A warning is a non-critical system fault which will either maintain full system operation or may cause the steering and/or boat speed to be reduced.

Although a warning does not always adversely affect steering or shift and throttle performance, it is an indication of a problem in the system and should be remedied.

In the case of a warning fault, the CANtrak buzzer will sound intermittently (until muted) and the CANtrak will display the Warning screen. See Section 10.2.3 for warning fault handling specifics.

In the case of an EST system warning fault, in addition to the CANtrak message and buzzer, both red lights on the control head will flash red slowly (once per second).

In the case of a Joystick warning fault, in addition to the CANtrak message and buzzer, the joystick Take Command button light will alternate flashing red and blue.

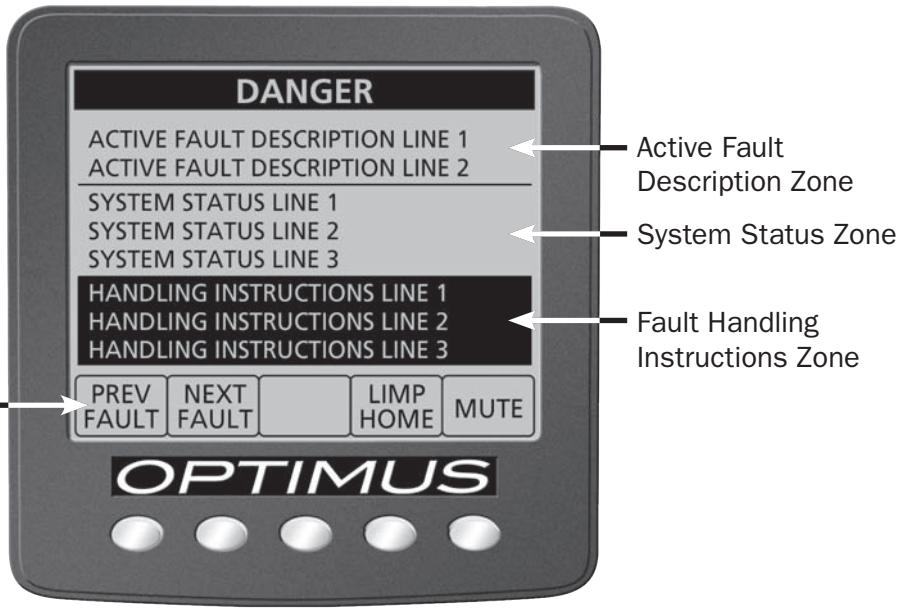
10.2 System Fault Handling

In case of a Danger or Warning message, the CANtrak display will advise the operator how to proceed. If the danger or warning is caused by the control system the control head lights will flash red. The following sections describe what to expect in case of either fault.

10.2.1 Danger Fault Handling

A danger fault is a critical system fault which will result in limited steering and/or shift and throttle performance and requires immediate action.

During a danger fault, the CANtrak display will display DANGER across the top, sound a continuous buzzer (until muted) and display fault information and handling in three zones. See the figure below.



Active Fault Description Zone

Provides details specific to the system fault. These will include a brief description of the fault and are primarily for troubleshooting purposes.

System Status Zone

Displays information about the status of the system and if the system has automatically reacted to the fault.

Fault Handling Instructions Zone

Provides detailed instructions on how to proceed. In the case of a danger fault, this will instruct the operator what to do and how to proceed should Limp Home mode be required.

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10.2.2 Limp Home

When a Danger fault results in steering and/or shift and throttle performance being restricted or suspended, the CANtrak may provide instructions on how to enter Limp Home mode.

Limp home will provide instructions for the user to manually move the engine(s), and/or control the shift and throttle, and allow the user to “limp home” at a reduced performance.

There are three Limp Home modes depending on the nature of the fault.

⚠ WARNING

Limp home mode is an override system. It may severely limit your boat control. It should ONLY be used in an emergency if you are unable to call for assistance. Proceed with extreme caution. Always wear PFDs and lanyard. Refer to the notice in Section 10.0.

Limp Home Mode 1

This mode occurs when the system can no longer provide steering to ANY of the engines. The CANtrak will instruct the operator to manually realign the engines using the service valves, and proceed home immediately using the shift and throttle controls to control the vessel as shown in the figure below.

Limp Home Mode 2

This mode occurs when the system can no longer provide steering to ONE of the engines. The CANtrak will instruct the operator to realign the non-responsive engine, tilt it out of the water and proceed home immediately using the responsive engine as shown in the figure below.

LIMP HOME MODE
AFFECTED ENGINE STEERING IS DISABLED
1. Always wear PFD devices
2. Put engines in neutral
3. Open steering service valves
4. Turn affected engine fully away from other
5. Close steering service valves
6. Fully tilt affected engine
7. Return to port
INFO
OK
OPTIMUS

Limp Home Mode 3

This mode occurs when the shift and/or throttle is compromised on both engines. The CANtrak will instruct the operator to use the shift and/or throttle manual overrides. If only one engine's shift and/or throttle is compromised, Limp Home Mode 3 may not be required and the CANtrak will instruct the operator how to proceed.

LIMP HOME MODE
SHIFT AND THROTTLE DISABLED
1. Locate and identify shift and throttle actuators. Read labels.
2. Set all lever A's into manual override position
3. Slowly turn (shift) lever B to engage gear. Then slowly turn (throttle) lever B to raise RPM.
4. Key off ignition to slow & stop.
OPTIMUS

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10.2.2 Limp Home (continued)

Engaging the Actuator(s)

In the unlikely event of a Danger warning on the shift and throttle system that cannot be cleared the boat can be operated by using the manual control overrides of the actuators. Proceed with caution as follows:

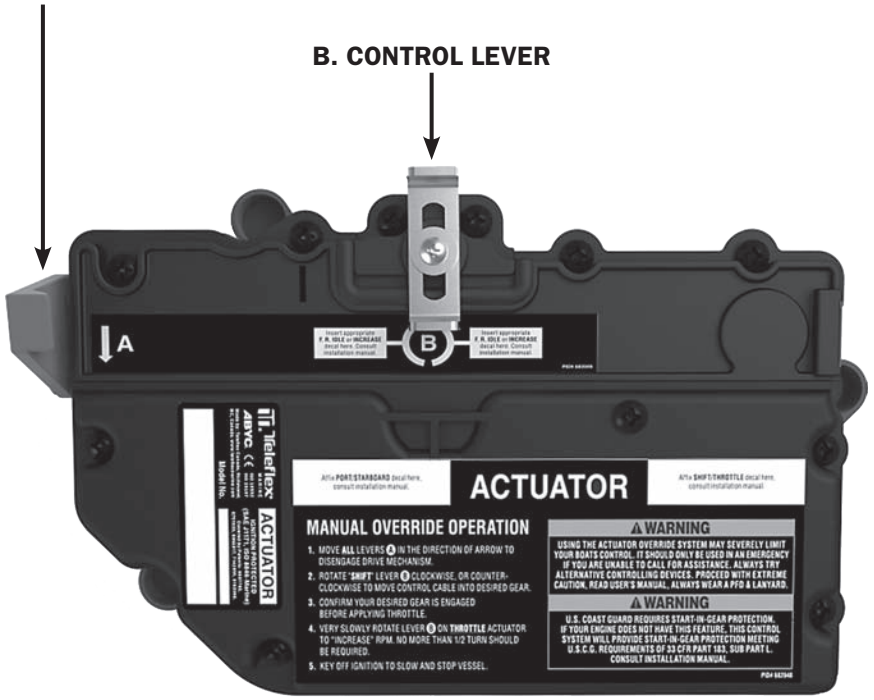
1. Release the actuator engagement lever (A) by moving it to the other end of its travel (red handle on side).
2. Rotate the control lever (B) to move the control cable to the engine.

NOTICE

If the lever cannot be rotated it is likely the fault is in the engine not the control system.

A. ENGAGEMENT LEVER

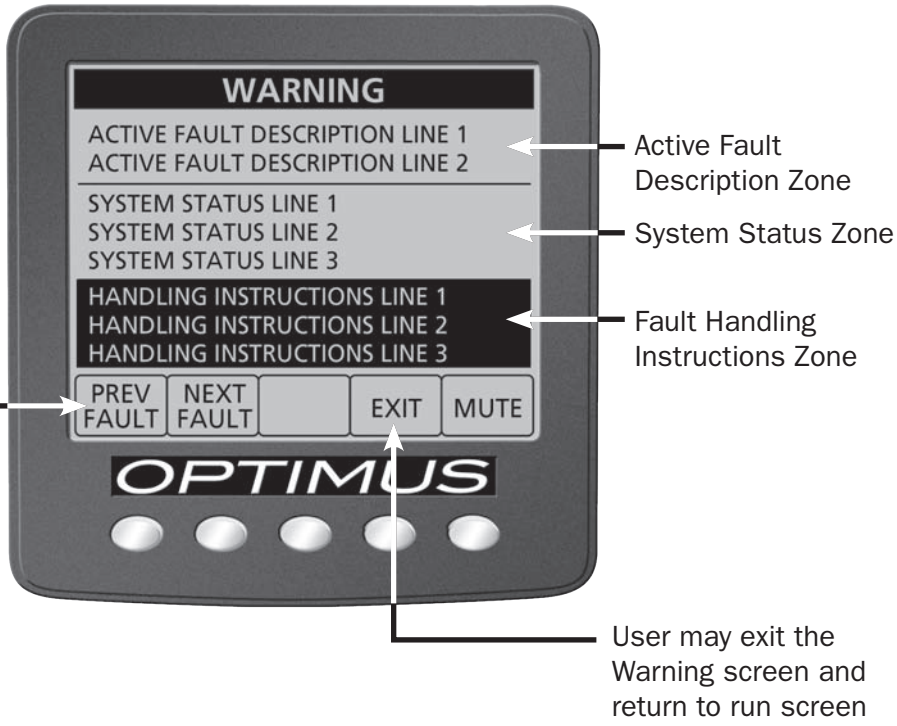
B. CONTROL LEVER


A
B
Teleflex
ACTUATOR
ACTUATOR
MANUAL OVERRIDE OPERATION
1. MOVE ALL LEVERS A IN THE DIRECTION OF ARROW TO DISENGAGE DRIVE MECHANISM.
2. ROTATE "SHIFT" LEVER B CLOCKWISE, OR COUNTER-CLOCKWISE TO MOVE CONTROL CABLE INTO DESIRED GEAR.
3. CONFIRM YOUR DESIRED GEAR IS ENGAGED BEFORE APPLYING THROTTLE.
4. VERY SLOWLY ROTATE LEVER B ON "THROTTLE" ACTUATOR TO "INCREASE" RPM. NO MORE THAN 1/2 TURN SHOULD BE REQUIRED.
5. KEY OFF IGNITION TO SLOW AND STOP VESSEL.
WARNING
USING THE ACTUATOR OVERRIDE SYSTEM MAY SEVERELY LIMIT YOUR BOATS CONTROL. IT SHOULD ONLY BE USED IN AN EMERGENCY IF YOU ARE UNABLE TO CALL FOR ASSISTANCE. ALWAYS TRY ALTERNATIVE CONTROLLING DEVICES. PROCEED WITH EXTREME CAUTION. READ USER'S MANUAL. ALWAYS WEAR A PFD & LANYARD.
WARNING
U.S. COAST GUARD REQUIRES START-IN-GEAR PROTECTION. IF YOUR ENGINE DOES NOT HAVE THIS FEATURE, THIS CONTROL SYSTEM WILL PROVIDE START-IN-GEAR PROTECTION MEETING U.S.C.G. REQUIREMENTS OF 33 CFR PART 183, SUB PART I. CONSULT INSTALLATION MANUAL.

10.2.3 Warning Fault Handling

A warning is a non-critical system fault which will either maintain full system operation or may cause the steering and/or boat speed to be reduced.

During a warning fault, the CANtrak will display the same information as with a danger fault but WARNING will appear across the top of the screen and the buzzer will sound intermittently (until muted). See the figure below.


WARNING
ACTIVE FAULT DESCRIPTION LINE 1
ACTIVE FAULT DESCRIPTION LINE 2
SYSTEM STATUS LINE 1
SYSTEM STATUS LINE 2
SYSTEM STATUS LINE 3
HANDLING INSTRUCTIONS LINE 1
HANDLING INSTRUCTIONS LINE 2
HANDLING INSTRUCTIONS LINE 3
PREV FAULT
NEXT FAULT
EXIT
MUTE
OPTIMUS
Active Fault Description Zone
System Status Zone
Fault Handling Instructions Zone
Will appear if multiple faults are active to allow user to scroll through
User may exit the Warning screen and return to run screen

The user may choose to exit the Warning screen and return to the All Helms Active screen by pressing the exit button, in which case the system will flash a warning icon on the run screen as shown on the next page. This icon will remain in place until the fault is repaired. If the system recovers from the fault, for example if a battery runs low and is subsequently charged, the warning screen will disappear and the system will automatically resume normal operation.

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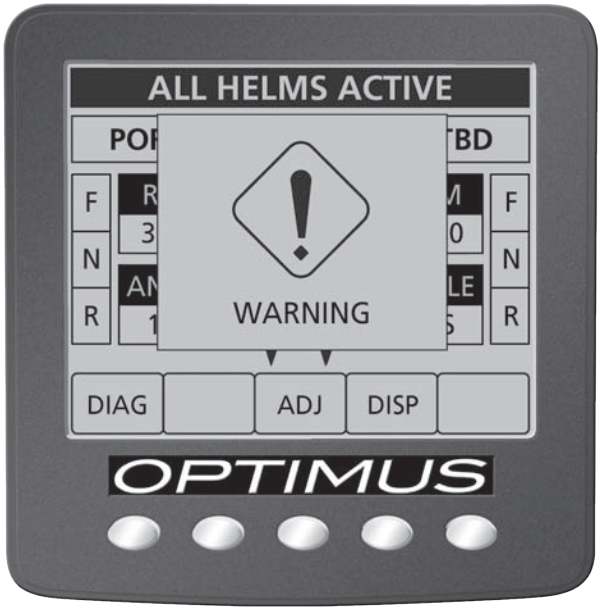
10.2.3 Warning Fault Handling (continued)

Although the system may still operate normally under many warning faults, the vessel should still be returned to port and serviced immediately.

RUN SCREEN WITH SYSTEM WARNING

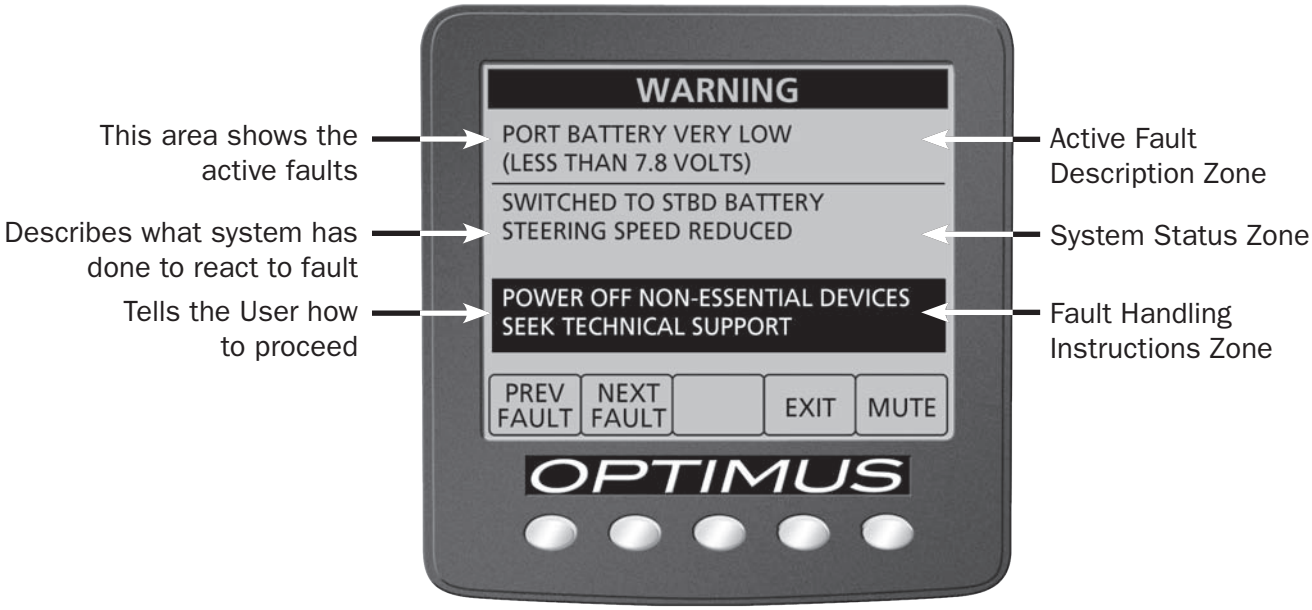


Some system warning faults may result in a reduced steering response and/or reduced throttle position (system will continue to steer normally but may respond slower or limit boat speed).

10.2.4 System Fault Handling – Example

The following is an example of how the system would respond to the warning fault hazard of a low port engine battery.

The CANtrak display will enter the warning screen mode and pulse the system warning buzzer. The three warning screen zones will appear as shown below.



In this case, the CANtrak tells the user to power off any non essential devices and to seek technical support as fault handling instructions. It also informs the user that the system has switched to the starboard battery and reduced the steering speed.

The vessel should be returned to port immediately for repair.

10.2.5 CANtrak Loss of Display

In the event of a loss of CANtrak display operation proceed as follows:

1. On a multiple helm station vessel each station should be equipped with a CANtrak display. Proceed to navigate from another helm station and immediately return to port for service.
2. If there are no secondary displays on board, at low speed carefully verify that the steering system and shift and throttle operates normally then immediately and cautiously proceed to port for service.

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10.2.5 CANtrak Loss of Display (continued)

3. In the event of a loss of steering or shift and throttle response and CANtrak display, and you are unable to obtain assistance and are in an emergency situation, engage Limp Home Modes 1, 2 or 3:

⚠ WARNING

Limp home mode is an override system. It may severely limit your boat control. It should ONLY be used in an emergency if you are unable to call for assistance. Proceed with extreme caution. Always wear PFDs and lanyard. Refer to the notice in Section 10.0.

Limp Home Mode 1

If the steering system can no longer provide steering to **ANY** of the engines, proceed by using Limp Home Mode 1, as follows:

1. Always wear PFD devices.
2. Put engine(s) in Neutral.
3. Open Steering Service Valves.
4. Manually center all engines.
5. Close Steering Service Valves
6. Return to port using throttles to steer.

Limp Home Mode 2

If the steering system can no longer provide steering to **ONE** of the engines, proceed by using Limp Home Mode 2, as follows:

1. Always wear PFD devices.
2. Put engine(s) in Neutral.
3. Open Steering Service Valves.
4. Turn affected engine fully away from other.
5. Close Steering Service Valves
6. Fully tilt affected engine.
7. Return to port.

In the event of loss of shift and throttle response to both engines, proceed by using Limp Home Mode 3, as follows:

Limp Home Mode 3

1. Locate and identify shift and throttle actuators. Read labels.
2. Set all lever A(s) into manual override position.
3. Slowly turn (shift) lever B to engage gear. Then slowly turn (throttle) lever B to raise RPM.
4. Key off ignition to slow & stop.

10.3 Buzzer

The buzzer is used to indicate a system fault. There are two different signals:

1. Continuously on. This indicates a **danger** fault. A danger fault is a critical system fault which will result in limited steering and/or shift and throttle performance and requires immediate action and immediate return to the nearest port. See Section 10.1.1.
2. Alternating on and off. This indicates a **warning** fault. A warning is a non-critical system fault which will either maintain full steering system operation or cause the steering and/or boat speed to be reduced. See Section 10.1.2.

All signals require immediate attention.

When the buzzer sounds, a screen will appear on the CANtrak indicating the cause for the alarm. The screen will also display a “mute” button which may be used to silence the alarm.

10.4 Reduced Performance

Under certain fault conditions the steering response and/or boat speed will slow down. A typical cause might be a very low battery. When this happens the CANtrak will advise the operator of the condition, indicate the reason, and supply instructions.

⚠ WARNING

Proceed with caution until the fault is corrected and normal operation returns.

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11.0 MAINTENANCE

⚠ WARNING

Following the routine maintenance schedules as outlined below, in the time frame noted will ensure years of service from your Optimus 360 Joystick control system, as well as keep you and your passengers safe from the dangers that are present on and off the water.

1. Owner(s) (End Users)

Prior to every use (see Section 8.3 for further details):

1. Check steering fluid level in all steering pumps.
2. Verify immediate steering response when turning steering wheel(s).
3. Inspect all steering hoses, fittings and mechanical and electrical cables for wear, kinks, or leaks.
4. Check for binding, loose, worn or leaking steering or shift/throttle control components.
5. Verify proper shift and throttle response to all control handles.
6. Verify that no faults or warnings are shown on the CANtrak display or on the Shift and Throttle Control Head.

⚠ WARNING

Do not operate boat if any component is not in proper working condition.

After every use:

1. Rinse the SmartCylinders with clean water and replace CANtrak sun cover.

Do NOT rinse the PCM, pumps, or the actuators.

2. Qualified Marine Mechanic

After the first 20 hours, then every 100 hours or 6 months thereafter (whichever comes first).

1. All points noted above.
2. Check tightness of ALL fasteners/fittings throughout the vessel control system. Tighten to correct torque specifications as required.
3. Check for mechanical play or slop throughout vessel control system, correct as required.
4. Check for signs of corrosion. If corrosion is present contact your dealer or Teleflex Marine.
5. Check all electrical harnesses and mechanical cables for chaffing and wear.

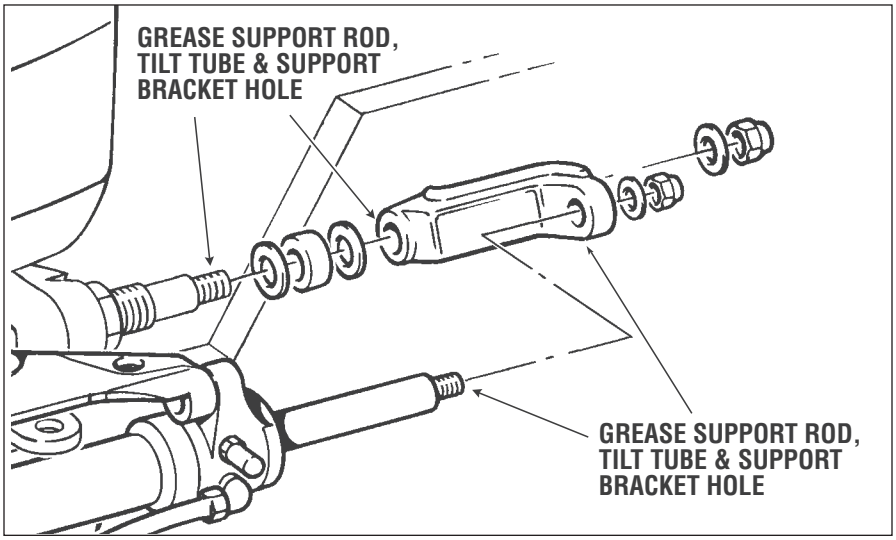
11.0 Maintenance (continued)

After the first 200 hours or 12 months thereafter (whichever comes first).

1. All points noted above.
2. Remove support rod from engine steering/tilt tube. Clean engine steering/tilt tube and re-grease using a good quality marine grease.
3. Grease support rod liberally.
4. Grease all contact points shown in the figure below. DO NOT remover the tiller bolt to re-grease.
5. Remove the steering wheel and re-grease the wheel shaft using a good quality marine grease.
6. Inspect hydraulic oil for cleanliness; flush if required.
7. Check that the service valve is free to move and in the closed position.

⚠ WARNING

Any work being performed with the steering system MUST be completed by a qualified mechanic with the working knowledge of the system.



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12.0 TROUBLESHOOTING GUIDE

⚠ WARNING

Whenever, in the following text, a solution calls for removal from vessel and/ or dismantling of system components, such work must ONLY be carried out by a qualified marine hydraulic mechanic. Teleflex offers the following as a guide only and is not responsible for any consequences resulting from incorrect dismantling repairs.

Optimus 360 will provide years of safe reliable performance with a minimum of service if properly installed.

Optimus 360 steering systems have been designed with protection against over-pressure situations, with the inclusion of a pressure relief valve and circuit breakers, to minimize the possibility of total loss of steering.

Most faults occur when the installation instructions are not followed and usually show up immediately upon filling the system. provided below, are the most common faults encountered and their likely cause and solution.

FAULT	CAUSE	SOLUTION
1. CANtrak does not turn ON?	Batteries not turned ON, or in poor working condition.	Load test batteries.
	Ignition wires disconnected.	Confirm all connections are in place.
	CANtrak connection damaged and/ or not connected.	Inspect wires for damage.
2. High/Low Speed wheel turn setting not working	Tachometer is not relaying information.	Confirm Tachometer is operating properly (check connections).
	CANtrak NOT writing proper information.	Confirm that your settings have been saved. If they are not saved, contact Tech support.
3. One engine does not steer, but CANtrak display is on.	Check circuit breaker for the engine.	Reset breaker. If it immediately trips a second time look for a shorted or pinched wire or failed component.
4. Will not shift	Gear case jammed.	Try manual control of actuator. If no motion, disconnect shift cable at engine. Check engine.

13.0 REPLACEMENT PARTS

13.1 SeaStar Electronic Power Steering Fluid

The Optimus 360 Steering System requires genuine SeaStar Electronic Power Steering Fluid.

In an emergency condition if SeaStar Electronic Power steering fluid is not available, the following fluids may be used for a short period of time:

- Sea Star Steering Fluid
- Automatic Transmission Fluid
- Motor Oil

If any of the above are used in the system, then the system should be flushed and refilled with SeaStar Electronic Power steering fluid when the boat is returned to port. In case of extreme emergency, any non-toxic, non-flammable fluid may provide temporary steering.

⚠ WARNING

Never use brake fluid.

SeaStar Electronic Power Steering Fluid Part Numbers

Quart HA5482
Gallon HA5483

For full listing of part numbers, please refer to the Optimus 360 Installation Manual (Book 60), part no. 682102.

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14.0 WARRANTY

14.1 Statement of Limited Warranty

NOTICE

We warrant to the original retain purchaser that **Marine Canada Acquisition Limited Partnership DBA Teleflex Canada** (herein forward referred to as **Teleflex Canada)** products have been manufactured free from defects in materials and workmanship. This warranty is effective for two years from date of purchase, excepting that where **Teleflex Canada** products are used commercially or in any rental or income producing activity, then this warranty is limited to one year from the date of purchase.

We will provide replacement product without charge, for and **Teleflex Canada** product meeting this warranty, which is returned (freight prepaid) within the warranty period to the dealer from whom such product were purchased, or to us at the appropriate address. In such a case, **Teleflex Canada** products found to be defective and covered by this warranty will be replace at **Teleflex Canada's** option, and returned to the customer.

The above quoted statement is an extract from the complete **Teleflex Canada** products warranty statement. A complete warranty policy is available in our **Teleflex Canada** products catalogue.

14.2 Return Goods Procedure

Prior to returning product to **Teleflex Canada** under warranty, please obtain a Return Goods Authorization number (claim number).

Be sure to label the goods with:
a) the name and address of the sender, and
b) the return good authorization number (claim number).

Please address the returned goods as follows:

From U.S.A.

RGA # ?
Teleflex Canada
c/o UPS-Supply Chain Solutions, Inc.
Door A37
1201 C Street NW
Auburn, WA 98001

From Canada

RGA # ?
Teleflex Canada
3831 No. 6 Road
Richmond, B.C.
Canada V6V 1P6

A APPENDIX

Specifications

Optimus 360 SYSTEM SPECIFICATIONS
(Based on EPSK1210 Twin Engine Corepack)

Operating Voltage: 12Vdc
Maximum System Pressure: 1200 PSI
# of wheel turns: Variable from 3.5 to 8
Typical Average Current Draw: ~6 to 8 Amps
Oil Type: SeaStar Electronic Power Steering Fluid

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B APPENDIX

EST Station Select Protection

Station Select Protection prevents accidental switching between control stations on multi-stationed boats. If turned on, a change of control stations requires that control head buttons be pressed in a specific sequence.

Operation

If Station Select Protection is turned on, to select or change stations use the following button sequence:

- Go to the station you wish to make active
- Press the Take Command button
- Press the Take Command button again
- Press the Neutral or 'N' button
- Press the Take Command button
- The station will go active (blue light on solid) if the handles are matched with the originally active station.
- If the blue light flashes, match the handles with the originally active station and the blue light will go solid.

⚠ WARNING

Until the blue light is on solid, the original active station retains control of the boat.

⚠ WARNING

On multiple helm station boats, all steering helms are active when the Optimus EPS is turned on. This is the same you would find on a conventional hydraulic steering system. Station Select only applies to the control head.

Notes

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Notes_____

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